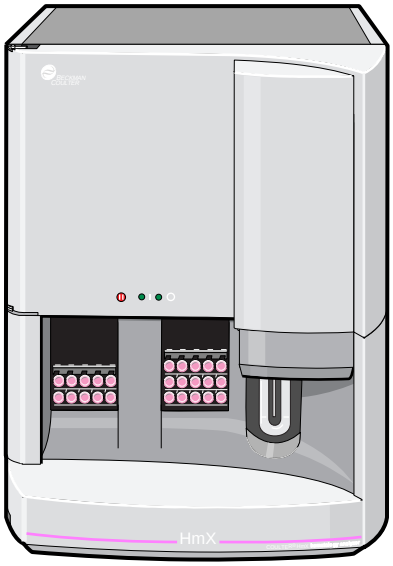
COULTER® HmX Hematology Analyzer with Autoloader

Special Procedures and Troubleshooting



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COULTER CORPORATION
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LEGAL NOTICES

READ ALL PRODUCT MANUALS AND CONSULT WITH BECKMAN COULTER-TRAINED PERSONNEL BEFORE ATTEMPTING TO OPERATE INSTRUMENT.

HAZARDS AND OPERATIONAL PRECAUTIONS AND LIMITATIONS

WARNINGS, CAUTIONS, and IMPORTANTS alert you as follows:

WARNING - Might cause injury.
CAUTION - Might cause damage to the instrument.
IMPORTANT - Might cause misleading results.

CAUTION System integrity might be compromised and operational failures might occur if:

- This equipment is used in a manner other than specified. Operate the instrument as instructed in the Product Manuals.
- You introduce software that is not authorized by Beckman Coulter into your computer. Only operate your system's computer with software authorized by Beckman Coulter.
- You install software that is not an original copyrighted version. Only use software that is an original copyrighted version to prevent virus contamination.

Beckman Coulter, Inc. urges its customers to comply with all national health and safety standards such as the use of barrier protection. This may include, but it is not limited to, protective eyewear, gloves, and suitable laboratory attire when operating or maintaining this or any other automated laboratory analyzer.

WARNING Risk of operator injury if all covers are not secured in place prior to instrument operation or you attempt to replace a part without carefully reading the replacement instructions. Do not attempt to replace any component until you carefully read the instructions for replacing the component.

IMPORTANT If you purchased this product from anyone other than Beckman Coulter or an authorized Beckman Coulter distributor, and, if it is not presently under a Beckman Coulter service maintenance agreement, Beckman Coulter cannot guarantee that the product is fitted with the most current mandatory engineering revisions or that you will receive the most current information bulletins concerning the product. If you purchased this product from a third party and would like further information concerning this topic, call your Beckman Coulter Representative.

REVISION STATUS

Initial Issue, 6/99
Software version 1.0.

This document applies to the latest software listed and higher versions. When a subsequent software version changes the information in this document, a new issue will be released.

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This introductory section contains the following topics:

- How to use your COULTER® HmX Hematology Analyzer with Autoloader Documentation set
- About this Manual
- Conventions
- Hot Keys
- List of Icons

HOW TO USE YOUR COULTER® HmX HEMATOLOGY ANALYZER WITH AUTOLOADER DOCUMENTATION SET

Use the **Reference** manual for in-depth information about what the instrument does, the methods it uses, its specifications, and information on installation, safety and software options.

Use the **Special Procedures and Troubleshooting** Manual to run a calibration, perform reproducibility and carryover checks, and to clean, replace or adjust a component of the instrument. The troubleshooting tables appear at the back of the manual.

Use the **Operator's Guide** for the day-to-day running of your instrument. Read the System Overview chapter to become familiar with the different parts of your system. Then go through the detailed step-by-step procedures of start up, running controls and samples, reviewing data and shutdown.

Use the **Host Specifications** Manual to locate information about transmission to a host computer.

Use the **Master Index** to locate a subject in your documentation set.

See the Documentation page on the back cover of this manual for the contents of each manual. It can help you to determine quickly which manual contains the information you need.

ABOUT THIS MANUAL

Your HmX Hematology Analyzer with Autoloader Special Procedures and Troubleshooting manual provides in-depth information about how to run a calibration, how to perform reproducibility and carryover checks, how to clean, replace, or adjust a component of the instrument, and provides troubleshooting tables as diagnostic tools.

This information is organized as follows:

- Chapter 1, Calibration
  Contains information on how to run a CBC calibration with COULTER S-CAL® calibrator or whole blood.
- Chapter 2, Reproducibility and Carryover
  Contains information on how to run reproducibility and carryover checks.
- Chapter 3, Cleaning Procedures
  Contains specific procedures for cleaning the apertures, flow cell, vacuum trap, blood sampling valve, sensors, cassettes, surfaces, and for clearing a flow cell clog.

- Chapter 4, Adjust/Replace Procedures
  Contains procedures on how to reset the system, perform a system test, adjust pressure and low vacuum and optimize the DMS hard disk. This chapter also presents specific procedures for replacing reagent containers, the waste container, the waste assembly, pickup tubes, fuses, check valves, tubing, pinch valves, aperture block O-rings, the hemoglobin lamp, and the needle.
- Chapter 5, Troubleshooting
  Contains a troubleshooting overview, charts for troubleshooting the CBC through unusual results, sections on troubleshooting the autoloader mechanism and autoloader check procedures, a guide for troubleshooting the diff through scatterplots and histograms, and an error message table.
- Use the index to easily locate specific information in this manual.

CONVENTIONS

This manual uses the following conventions:

- *ITALICS* indicate screen messages such as *RESET THE SYSTEM* or *Press any key.*
- **Bold** indicates
  - a menu item such as **Run Samples**
  - or a function such as **F3 Run**.
- The software path to access the needed function or screen appears in a series separated by double arrow heads. For example, the path to the Reagents set up screen is:

  Special Functions ▸▸ Set Up ▸▸ System Set Up ▸▸ Reagents.

  To select a menu item, highlight it then press Enter.
- ▢ indicates a key (such as Enter).
- ▢ ▢ indicates to press and release the first key listed, then press and release the next key listed.
- ▢+▢ indicates to press and hold the first key listed, then press the next key.

HOT KEYS (SHORTCUTS)

F1	Go to the Access Screen. This is only available when the Main Menu is displayed.	Alt+End	Stops instrument beeping and removes the error message at the bottom of the screen.
F4	Print.	Ctrl+F2	Move from the current screen to the Error file and back to the original screen.
F9	Exit (unless the **F3 Run** window is displayed, then the function of F9 is Stop.)	Ctrl+F9	Stop cycle.
F10	Save and/or return to the previous screen.	Ctrl+C	Clear the autoloader bed.

LIST OF ICONS

Open the upper front door.

Close the upper front door.

Open the lower front door.

Close the lower front door.

Open the right side door.

Close the right side door.

Remove the left side panel.

Check for leaks.

Print the screen for your logbook.

1.1 CBC CALIBRATION - GENERAL

Calibration is a procedure to standardize the instrument by determining its deviation from calibration references and to apply any necessary correction factors.

Recommended Conditions

Beckman Coulter recommends that you perform the Calibration procedure:

- In the Primary mode.
- With the room temperature within ambient range (16-32˚C, 60-90°F).
- Using S-CAL calibrator as an alternative to whole blood.

When to Calibrate

You should calibrate your instrument:

- At installation, before you begin analyzing samples.
- After you replace any component dealing with
  - dilution preparation, such as the BSV
  - primary measurement, such as an aperture.
- If your Beckman Coulter Representative suggests you calibrate.

When to Verify

You should verify the calibration of your instrument:

- As dictated by your laboratory procedures, local or national regulations.
- When controls begin to show evidence of unusual trends.
- When controls exceed the manufacturer's defined acceptable limits.
- If the average ambient room temperature changes more than 10°F (5.5°C) from the room temperature during your last calibration.

In the normal process of tracking data for an extended period of time, your laboratory can make a specific decision to recalibrate a given parameter. Never adjust to a specific value based on an individual sample result.

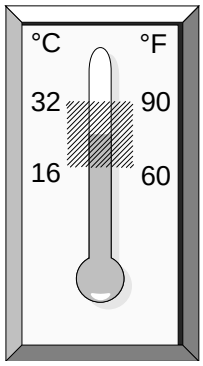
1.2 CBC CALIBRATION PRELIMINARY PROCEDURES

1. Make sure you have enough reagents to complete the entire procedure. Replace if necessary using the procedure in Heading 4.12, REPLACE REAGENT CONTAINERS.
2. Do you routinely shut down the HmX Hematology Analyzer with Autoloader for at least 30 minutes every 24 hours with COULTER CLENZ® cleaning agent?
   - If yes:
     From the Access Screen, press F3 **Clean.**

     Note: As an alternative, you can shut down the instrument for 30 minutes, then start up.
   - If no:
     Follow the directions under Heading 3.2, BLEACH APERTURES AND FLOW CELL/DISINFECTto bleach the apertures.
3. Bleach the aspiration system.
   a. Put one part high-quality, fragrance-free bleach (5% sodium hypochlorite) and one part distilled water in a cap-pierce tube.
   b. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Fluidic Tests ▸▸ Clean Needle.**
   c. Press Enter.
   d. Follow the screen instructions.
4. Perform Startup.
5. Run commercial cell controls.

1.3 CBC CALIBRATION WITH S-CAL® CALIBRATOR

1. Take the S-CAL calibrator kit out of the refrigerator.
2. Remove one vial of S-CAL calibrator and one empty glass tube from the kit. Let the S-CAL calibrator warm at ambient temperature while you do steps 3 through 8.
3. Return the other unopened vial of S-CAL calibrator and empty glass tube to the refrigerator immediately.



4. Select **Special Functions ▸▸ Calibration ▸▸ CBC Calibration.**
5. Press F5 **# OF ASPIRATIONS**. Set to 11.
6. Press F2 **START PRIMARY**.
7. If there is data in the table:
   a. Press F8 **Del Table**.
   b. Press the Spacebar to answer YES.
   c. Press Enter.
8. Prepare the CBC Calibration screen.
   - Enter the S-CAL calibrator assigned values (from the package insert) on the REF. VALUES line.
   - Enter the expiration date and the lot number.

   Note: You can enter or change these values anytime before, during, or after running S-CAL calibrator.

CBC CALIBRATION

RUN	WBC	RBC	HGB	MCV	PLT	MPV	N =10
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
MEAN	0.00	0.000	0.00	0.0	0.0	0.00	
NEW CAL FAC	0.000	0.000	0.000	0.000	0.000	0.000	
OLD CAL FAC	1.161	1.233	1.243	0.911	1.183	1.053	
%CV	0.0	0.0	0.0	0.0	0.0	0.0	
FAC. % DIFF	0.00	0.00	0.00	0.00	0.00	0.00	
DELTA DIFF	0.00	0.000	0.00	0.0	0.0	0.00	EXP 01/25/99
REF. VALUES	8.60	4.220	12.70	85.9	197.0	10.70	LOT 5730

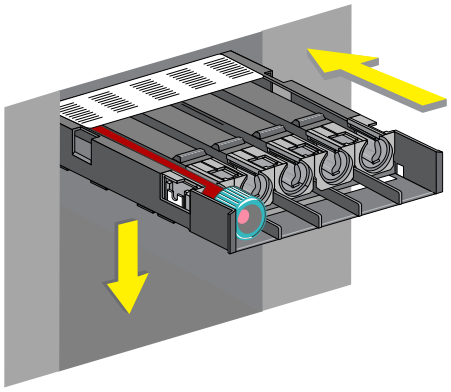
IMPORTANT Possible calibration error can occur if the S-CAL calibrator is inadequately mixed, handled roughly, or allowed to sit at room temperature for too long.

- Complete the calibration procedure (steps 8-11) within 1 hour of opening the vial.
- Take care in mixing. Inadequate mixing, or rough handling can cause incorrect results, resulting in calibration error.

WARNING Risk of biohazardous contamination if you do not remove the cap from the S-CAL calibrator vial properly. Use an absorbent material (such as guaze or paper wipes) to remove the cap from the vial of S-CAL calibrator. Any spray produced upon opening is absorbed by the guaze or paper wipe, avoiding accidental contact with the product.

9. Once the S-CAL calibrator equilibrates at ambient temperature (approximately 15 minutes after removal from refrigerator):
   a. Roll the vial slowly back and forth between the palms of the hands eight times in an upright position.
   b. Invert the vial and again slowly roll it back and forth eight times.
   c. Gently invert the vial eight times.
   d. Repeat this mixing procedure.
   e. Inspect the vial contents to determine that all the cells have been uniformly distributed. Repeat the mixing procedure if vial contents have not been totally distributed.
10. Transfer the S-CAL calibrator from the plastic vial to the glass tube using a pipet.

    Do not fill the tube all the way to the top; leave a 1/4 inch air space.
11. Load the glass tube into a cassette and place the cassette into the loading bay.



12. After the cycles are complete, Press F4 **Print** to print the screen for your logbook. Press F3 **Run**, F9 **Stop**. Press Esc.

13. Assess the run:

    a. Check for trending. If trending is present, STOP. There could be an instrument problem. Call your Beckman Coulter Representative.

CBC CALIBRATION

RUN	WBC	RBC	HGB	MCV	PLT	MPV	N =10
DEL	9.07	4.256	12.67	85.9	204.6	10.64	
2	8.62	4.145	12.46	86.4	203.3	10.65	
3	8.80	4.181	12.60	85.6	206.0	10.67	
4	8.75	4.128	12.50	85.7	212.5	10.65	
5	8.72	4.141	12.46	85.8	208.6	10.62	
6	8.60	4.161	12.50	85.4	200.3	10.83	
7	8.83	4.202	12.56	85.4	212.8	10.67	
8	8.88	4.175	12.65	86.0	214.3	10.71	
9	8.99	4.187	12.55	85.7	204.8	10.60	
10	8.75	4.178	12.56	85.7	197.7	10.60	
11	8.61	4.157	12.65	86.7	193.9	10.79	
MEAN	8.75	4.165	12.55	85.8	205.4	10.68	
NEW CAL FAC	1.174	1.301	1.266	0.912	1.301	1.066	
OLD CAL FAC	1.155	1.297	1.261	0.922	1.291	1.054	
%CV	1.4	0.6	0.6	0.5	3.3	0.7	
FAC. % DIFF	1.66	0.35	0.41	-1.10	0.77	1.13	
DELTA DIFF	0.15	0.014	0.05	0.9	1.6	0.12	EXP 04/20/99
REF. VALUES	8.90	4.180	12.60	84.9	207.0	10.80	LOT 5737

    b. Verify that the %CV (coefficient of variation) for each parameter does not exceed its limit. If any parameter exceeds its limit, STOP. There could be an instrument problem. Call your Beckman Coulter Representative.

	%CV
WBC	≤2.5
RBC	≤2.0
Hgb	≤1.5
MCV	≤2.0
Plt	≤5.0
MPV	≤3.0

IMPORTANT Misleading results could occur if you calibrate the MCV when the RBC FAC (Factor) %Diff is above the limits shown in step 14. Do not calibrate the MCV if the RBC FAC %DIFF is above these limits.

14. Determine which calibration factors (if any) should be changed by checking the FAC%DIFF and DELTA DIFF values against these ranges.

    Note: Disregard any minus signs on FAC%DIFF values.

    - If both the FAC%DIFF and DELTA DIFF values of a parameter fall below their lower limits, **that parameter does not need to be calibrated**.

      Note: If all parameter values fall below the lower limits of both ranges, you are finished. Resume normal operation.
    - If either the FAC%DIFF or DELTA DIFF value of a parameter exceeds its upper limit, STOP. There could be an instrument problem. Call your Beckman Coulter Representative.
    - If either the FAC%DIFF or DELTA DIFF value of a parameter falls between its lower and upper limits that parameter should be calibrated. Continue to step 15.

	Calibrate if FAC%DIFF is:	**Calibrate if DELTA DIFF is**
WBC	>1.25 AND ≤5.00	>0.10 AND ≤0.40
RBC	>0.70 AND ≤2.00	>0.03 AND ≤0.09
Hgb	>0.78 AND ≤3.00	>0.10 AND ≤0.40
MCV	>1.18 AND ≤2.50	>1.00 AND ≤2.00
Plt	>2.70 AND ≤9.00	>6.00 AND ≤20.0
MPV	>5.00 AND ≤20.00	>0.50 AND ≤2.00

15. Is *Select Function* displayed?
    - If NO, press F3 **Run**, F9 **Stop**. Press Esc.
    - If YES, go to step 16.
16. Select the parameters to be calibrated.
    a. Press F5 **Optns**.
    b. Select **Select Parameters**.
    c. Set YES for parameters you are adjusting, NO for the others. Use the Spacebar to toggle between YES and NO.
    d. Press Esc.

17. Select **Transmit Factors**.

    The following message appears:

    WARNING - DATA WILL BE CLEARED AFTER TRANSMISSION. DO YOU WANT TO PRINT DATA? Y/N

    If you did not print the calibration screen in step 11, press Y. Otherwise, press N.

18. Press F4 **Print** to print this final calibration screen for your logbook. It reflects the new calibration factors for the parameters you adjusted.

19. Verify calibration by cycling commercial cell control in the primary mode.
    - If any of the control level's result is outside of its Expected Range, run a second sample of the control.
    - If the second sample is also outside of the Expected Range, call your Beckman Coulter Representative.

1.4 WHOLE-BLOOD CALIBRATION

This is an alternative to S-CAL calibrator.

Collect 20 normal, fresh whole-blood specimens. Be sure to collect enough to cycle each specimen three times on the HmX Hematology Analyzer with Autoloader and three times each on the reference instrument.

Reference Values

1. To establish your reference values, use these reference instruments and methods:
   - WBC and RBC from the COULTER ZBI™ analyzer or equivalent particle counter used with ISOTON® II diluent and ZAP-OGLOBIN® II lytic reagent.
   - Hgb from hemiglobin cyanide spectrophotometric procedure which follows NCCLS Standard H15-A.
   - MCV from packed-cell volume (PCV) measured by a hematocrit procedure which follows NCCLS Standard H7-A. Divide this value by the reference RBC count. No measurement of trapped plasma occurs.
   - Plt from COULTER ZBI analyzer or equivalent particle counter used with ISOTON II diluent.
2. Assess each of your 20 samples three times for each type of reference value:
   - Three times on the Model ZBI analyzer or equivalent if you are calibrating for WBC and RBC.
   - Three times using the spectrophotometer if you are calibrating for Hgb.

- Three times using the hematocrit procedure if you are calibrating for MCV.
- Three times using the Model ZBI analyzer or equivalent if you are calibrating for Plt.

3. Average the 60 results for each test to find your reference values.

Whole-Blood Calibration Run

1. Select **Special Functions ▸▸ Calibration ▸▸ CBC Calibration.**
2. Press F5 **# OF ASPIRATIONS**. Set to 3.
3. Press F2 **Start Primary**.
4. If there is any data in the table:
   a. Press F8 **Del Table**.
   b. Press the Spacebar to select Yes.
   c. Press Enter.
5. Enter your reference values on the REF. VALUES line at the bottom of the CBC Calibration screen.

   Note: If the cursor is not on the REF. VALUES line, Press F2 **Run/Ref** to get it there.
6. Load the 20 tubes of blood into cassettes and place the cassettes into the loading bay.
7. Assess calibration results and complete the procedure using steps 13-19 under Heading 1.3, CBC CALIBRATION WITH S-CAL® CALIBRATOR.

2.1 REPRODUCIBILITY CHECK

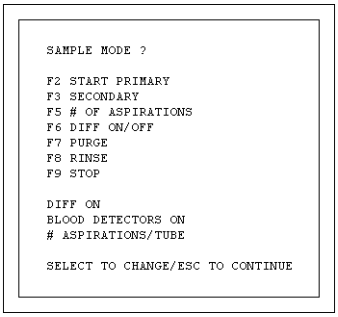
Use an unopened, normal-level, COULTER 5C® cell control for reproducibility studies (Procedure A). You can also use normal whole blood (Procedure B).

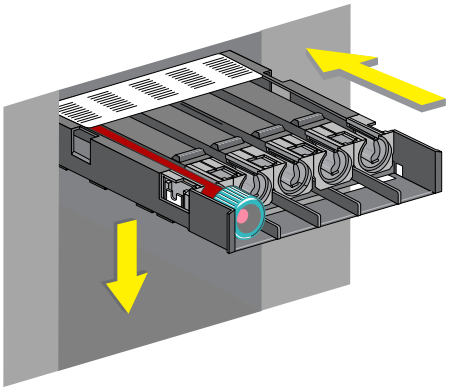
Procedure A

1. Select **Special Functions ▸▸ Calibration ▸▸ Reproducibility.**
2. Do you want to check the reproducibility of the WBC differential?
   - If yes, verify that **DIFF** is ON.
   - If no, verify that **DIFF** is OFF.

   To change the state of **DIFF**, Press F6.
3. Press F5 **# OF ASPIRATIONS**. Set to 11.
4. Press F2 **START PRIMARY**.
5. Does the following message appear?

   MODE REQUIRES EXISTING RUNS TO BE DELETED. ARE YOU SURE?: NO
   - If this message appears: Press Spacebar to answer YES. Press Enter. The DMS deletes the old data.
   - If this message does not appear, and there is data in the table: Press Enter. Press F4 **Print** for a copy of the data. When ready to delete the data, press F8 **Del Table**. Press Spacebar to answer YES. Press Enter. The old data is deleted.
6. Follow the directions on the cell control package insert for storage, preparation and mixing.
7. Load the cell control tube into a cassette **with the bar-code label facing down** and place the cassette into the loading bay.





Note: The first sample is automatically marked DEL and its results are not included in the calculations.

REPRODUCIBILITY

N= 10 Mode=P

Run	WBC	RBC	HGB	MCV	RDW	PLT	MPV	LY%	MO%	NE%	EO%	BA%
DEL	7.0	4.38	13.2	87.3	13.3	255	10.4	24.5	15.2	57.0	3.0	0.3
2	7.1	4.36	13.0	87.1	13.2	248	10.8	23.3	15.0	55.3	6.1	0.3
3	6.9	4.31	13.0	87.2	13.1	242	10.6	24.3	14.6	55.8	5.0	0.3
4	6.9	4.37	13.0	87.3	13.6	248	10.6	22.8	16.0	54.6	6.1	0.5
5	6.8	4.31	13.1	87.5	13.4	245	10.4	24.6	14.0	55.9	5.2	0.3
6	7.1	4.38	13.0	87.0	13.3	248	10.5	25.1	14.8	54.6	5.2	0.3
7	7.1	4.22	13.2	87.4	13.5	237	10.6	25.0	14.5	55.0	5.3	0.2
8	7.0	4.36	13.2	86.8	13.3	251	10.5	24.7	15.2	56.8	5.1	0.2
9	7.1	4.29	13.1	87.2	13.5	248	10.7	24.6	14.9	54.8	5.4	0.3
10	7.0	4.22	13.0	87.2	13.3	249	10.6	24.5	14.5	55.9	5.2	0.3
11	7.2	4.34	13.2	87.1	13.2	244	10.5	24.2	15.3	55.5	4.6	0.4
Mean	7.0	4.33	13.1	87.2	13.3	246.6	10.6	24.3	14.9	55.5	4.9	0.3
2SD	0.25	0.10	0.19	0.4	0.32	9.9	0.25	1.46	1.08	1.71	2.15	0.18
%CV	1.8	1.2	0.7	0.2	1.2	2.0	1.2	3.0	3.6	1.5	21.9	30.0
Min	6.8	4.22	13.0	86.8	13.1	237.0	10.4	22.8	14.0	54.6	5.0	0.2
Max	7.2	4.38	13.2	87.5	13.6	255.0	10.8	25.1	16.0	57.0	6.1	0.5
Diff	0.4	0.16	0.2	0.7	0.5	18.0	0.4	2.3	2.0	2.4	1.1	0.3

8. Check results.
   - Verify that the %CV (coefficient of variation) for each parameter does not exceed its limit.

%CV	
WBC	2.5%
RBC	2.0%
Hgb	1.5%
MCV	2.0%
Plt	5.0%
MPV	3.0%

   - If you ran with the DIFF ON, check the values on the Diff line at the bottom of the screen with these limits. This number represents the difference between the lowest and highest results within the run.

Max Range/Low to High (check Diff line at bottom of screen)	
LY%	≤4.8
MO%	≤3.2
NE%	≤4.8
EO%	≤1.6
BA%	≤1.6

   - If any result is OUT, call your Beckman Coulter Representative.

9. Press F4 **Print** to print the screen for your logbook.

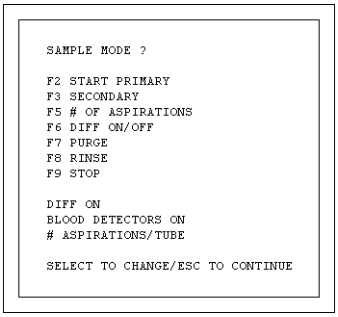
Procedure B

1. Collect one tube of blood from a donor who:
   - Is receiving no medication.
   - Has normal hematologic parameters (with a WBC count between 5 x 10^3 µL and 10 x 10^3 µL).
   - Has normal erythrocyte, leukocyte and platelet morphology and
   - If you want to check reproducibility on the WBC differential, the diff parameters values must fall within these ranges:

Neutrophils	40 to 72%
Lymphocytes	17 to 45%
Monocytes	4 to 12%
Eosinophils	0 to 10%
Basophils	0 to 1%

2. Select **Special Functions ▸▸ Calibration ▸▸ Reproducibility.**
3. Do you want to check the reproducibility of the WBC differential?
   - If yes, verify that **DIFF** is ON.
   - If no, verify that **DIFF** is OFF.

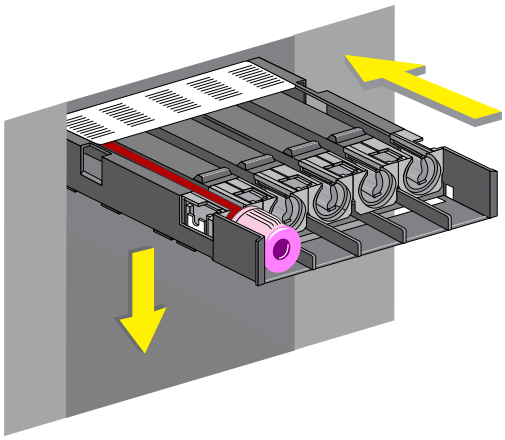
   To change the state of **DIFF**, Press F6.
4. Press F5 **# OF ASPIRATIONS**. Set to 11.
5. Press F2 **START PRIMARY**.



6. Does the following message appear?

   MODE REQUIRES EXISTING RUNS TO BE DELETED. ARE YOU SURE?: NO
   - If this message appears: Press Spacebar to answer YES. Press Enter. The DMS deletes the old data.
   - If this message does not appear, and there is data in the table: Press Enter. Press F4 **Print** for a copy of the data. When ready to delete the data, press F8 **Del Table**. Press Spacebar to answer YES. Press Enter. The old data is deleted.

7. Load the donor blood tube into a cassette and place the cassette into the loading bay.



Note: The first sample is automatically marked DEL and its results are not included in the calculations.

REPRODUCIBILITY

									N= 10		Mode=P	
Run	WBC	RBC	HGB	MCV	RDW	PLT	MPV	LY%	MO%	NE%	EO%	BA%
DEL	7.0	4.38	13.2	87.3	13.3	255	10.4	24.5	15.2	57.0	3.0	0.3
2	7.1	4.36	13.0	87.1	13.2	248	10.8	23.3	15.0	55.3	6.1	0.3
3	6.9	4.31	13.0	87.2	13.1	242	10.6	24.3	14.6	55.8	5.0	0.3
4	6.9	4.37	13.0	87.3	13.6	248	10.6	22.8	16.0	54.6	6.1	0.5
5	6.8	4.31	13.1	87.5	13.4	245	10.4	24.6	14.0	55.9	5.2	0.3
6	7.1	4.38	13.0	87.0	13.3	248	10.5	25.1	14.8	54.6	5.2	0.3
7	7.1	4.22	13.2	87.4	13.5	237	10.6	25.0	14.5	55.0	5.3	0.2
8	7.0	4.36	13.2	86.8	13.3	251	10.5	24.7	15.2	56.8	5.1	0.2
9	7.1	4.29	13.1	87.2	13.5	248	10.7	24.6	14.9	54.8	5.4	0.3
10	7.0	4.22	13.0	87.2	13.3	249	10.6	24.5	14.5	55.9	5.2	0.3
11	7.2	4.34	13.2	87.1	13.2	244	10.5	24.2	15.3	55.5	4.6	0.4
Mean	7.0	4.33	13.1	87.2	13.3	246.6	10.6	24.3	14.9	55.5	4.9	0.3
2SD	0.25	0.10	0.19	0.4	0.32	9.9	0.25	1.46	1.08	1.71	2.15	0.18
%CV	1.8	1.2	0.7	0.2	1.2	2.0	1.2	3.0	3.6	1.5	21.9	30.0
Min	6.8	4.22	13.0	86.8	13.1	237.0	10.4	22.8	14.0	54.6	5.0	0.2
Max	7.2	4.38	13.2	87.5	13.6	255.0	10.8	25.1	16.0	57.0	6.1	0.5
Diff	0.4	0.16	0.2	0.7	0.5	18.0	0.4	2.3	2.0	2.4	1.1	0.3

8. Check results.

- Verify that the %CV (coefficient of variation) for each parameter does not exceed its limit.

%CV	
WBC	2.5%
RBC	2.0%
Hgb	1.5%
MCV	2.0%
Plt	5.0%
MPV	3.0%

- If you ran with the DIFF ON, check the values on the Diff line at the bottom of the screen with these limits. This number represents the difference between the lowest and highest results within the run.

Max Range/Low to High (check Diff line at bottom of screen)	
LY%	≤4.8
MO%	≤3.2
NE%	≤4.8
EO%	≤1.6
BA%	≤1.6

- If any result is OUT:
  - Repeat the procedure with a different blood sample.
  - If they are still OUT, call your Beckman Coulter Representative.

9. Press F4 **Print** to print the screen for your logbook.

2.2 RETIC REPRODUCIBILITY CHECK

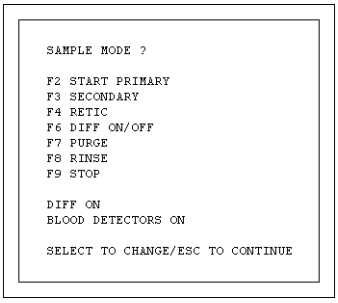
1. Select **Special Functions ▸▸ Calibration ▸▸ Reproducibility.**
2. Press F4 **RETIC.**
3. If there is data in the table:
   a. Press F8 **Del Table**.
   b. Press Spacebar to answer YES.
   c. Press Enter.

   The old data is deleted.
4. Prepare a Retic whole blood/stain preparation according to the instructions in the Retic-Prep reagent kit. Incubate for at least 5 minutes.

   You can use this whole blood/stain preparation for up to 1 hour.
5. From the solution prepared in step 4, dispense 2 µL into the bottom of a clean tube. Immediately dispense 2 mL of clearing solution (Reagent B) into the tube. Wait for 30 seconds then analyze.

   Repeat 30 times for a total of 31 runs.
6. The first sample in the run is automatically deleted. Check statistics at the bottom of the Reproducibility screen. The results must not exceed these limits:

   If results exceed any limit, call your Beckman Coulter Representative.



Limits (whichever is greater

Mean Retic%	SD Limit	CV Limit
<1.00%	<0.23	±23%
00-4.00	<0.23	±17%
01-15	+<0.68	±15%

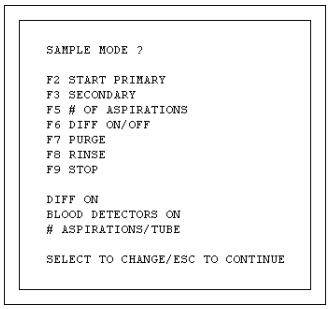
2.3 CARRYOVER CHECK

1. Select **Special Functions ▸▸ Calibration ▸▸ Carryover.**
2. Press F2 **START PRIMARY**.

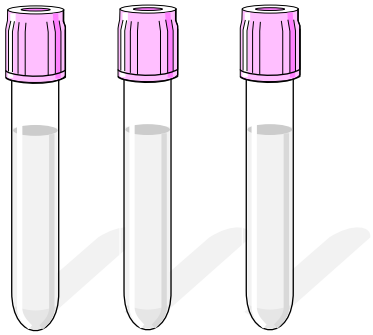
   If the following message appears:

   MODE REQUIRES EXISTING RUNS TO BE DELETED ARE YOU SURE?: NO

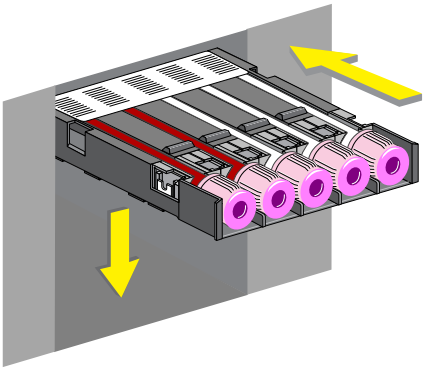
   Press Spacebar to answer YES.
   Press Enter. The DMS deletes the data.



3. Select 2 normal whole blood samples. At least one of them should have a WBC count at the high end of normal (about 10 x 10^3 µL).
4. Fill three tubes with diluent, then cap.

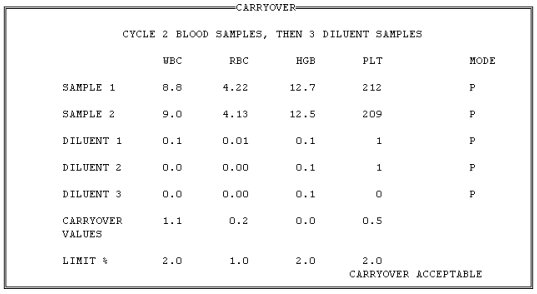


5. Load a cassette as follows:
   - Put the two normal whole blood samples in positions 1 and 2. Put the sample with the higher WBC count in position 2.
   - Put the three tubes of diluent in the remaining positions.
6. Place the cassette into the loading bay and wait until the cycles complete.



7. Check the lower right corner of the screen for *CARRYOVER ACCEPTABLE*.

   If it is not acceptable, the parameter that is out of limits is flagged with an H:
   - Repeat the procedure using different normal bloods and three fresh tubes of diluent.
   - If results are still unacceptable, call your Beckman Coulter Representative.


CARRYOVER
CYCLE 2 BLOOD SAMPLES, THEN 3 DILUENT SAMPLES
WBC RBC HGB PLT MODE
SAMPLE 1 8.8 4.22 12.7 212 P
SAMPLE 2 9.0 4.13 12.5 209 P
DILUENT 1 0.1 0.01 0.1 1 P
DILUENT 2 0.0 0.00 0.1 1 P
DILUENT 3 0.0 0.00 0.1 0 P
CARRYOVER VALUES 1.1 0.2 0.0 0.5
LIMIT % 2.0 1.0 2.0 2.0
CARRYOVER ACCEPTABLE

8. Press F4 to print the carryover screen for your logbook.

These are not routine procedures. Use them only if necessary for troubleshooting or before calibrating.

3.1 ZAP APERTURES

Zap the apertures when the instrument:

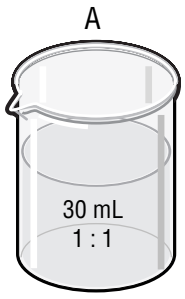
- Produces decreased cell counts.
- Produces increased MCV values.
- Produces increased voteouts.
- Fails to recover control values.
- Produces erratic MCV, RBC, WBC, or Plt counts.

1. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Fluidic Tests ▸▸ Multiple Aperture Zap.**
2. Press Enter. The instrument:
   - Fills the baths with cleaning agent.
   - Activates the burn circuit.
   - Activates alternating vacuum and pressure to bath apertures and flow cell.
   - Fills the baths with diluent.
3. Wait until you see *SELECT FUNCTION* on the screen to continue running specimens.

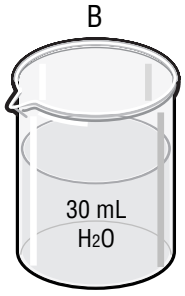
3.2 BLEACH APERTURES AND FLOW CELL/DISINFECT

1. Prepare a 30 mL solution of bleach and distilled water. Mix together:
   - 15 mL of high quality, fragrance-free bleach (5% sodium hypochlorite) and
   - 15 mL of distilled water.

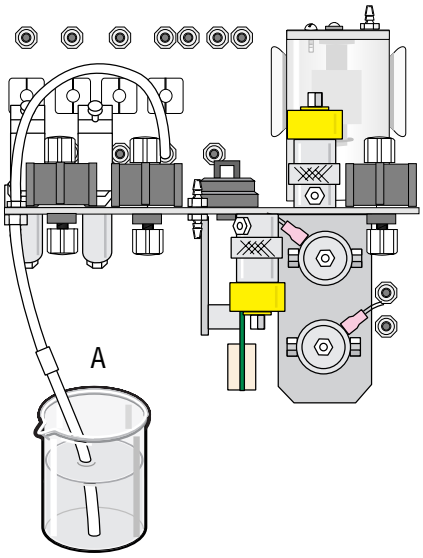
   Label this container "A".



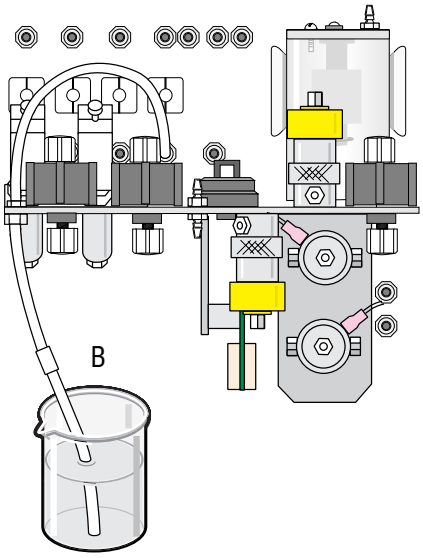
2. Put 30 mL of distilled water in a second container labeled "B".



3. Select **Diluter Functions ▸▸ Disinfect.**
4. Enter the maximum number of minutes that you want the bleach to stay in the HmX Hematology Analyzer. Range is 15 to 60 minutes. Default is 15 min.
5. Press Enter.
6. When the screen displays:
   Press any key when ready to aspirate bleach.
   a. Open the upper front door.
   b. Immerse the bleach probe in the bleach solution (container A).
   c. Press any key on the keyboard.
   d. Wait until the instrument aspirates all of the bleach solution then remove the empty container.



7. When the screen displays:
   Press any key when ready to aspirate distilled water
   a. Immerse the bleach probe in the distilled water (container B).
   b. Press any key on the keyboard.
   c. Wait until the instrument aspirates all of the distilled water then remove the empty container.



8. Close the upper front door.

   The instrument:

   - Disinfects for the designated number of minutes.

     Note: You can end this part of the disinfect cycle at any time by pressing F4.
   - Replaces the bleach solution with cleaning agent.
   - Starts up.

9. Wait until the screen displays *SELECT FUNCTION* before you touch any keys.

   When you see *SELECT FUNCTION*, check that the Startup results are acceptable.

   - If yes, you can resume your normal operation.
   - If no, repeat Startup.

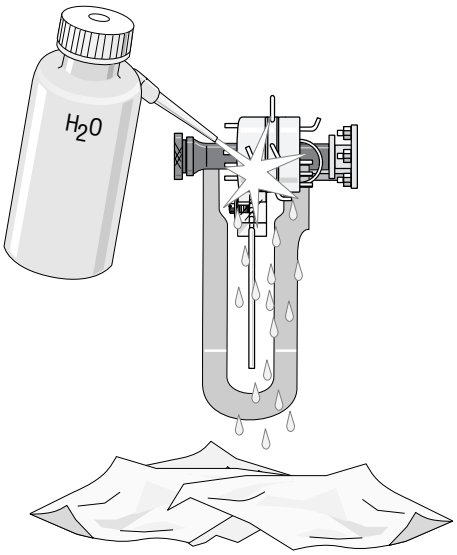
3.3 CLEAN OUTSIDE OF BLOOD SAMPLING VALVE (BSV)

Use this procedure if there is an excessive buildup of cleaning agent on the outside of the BSV.

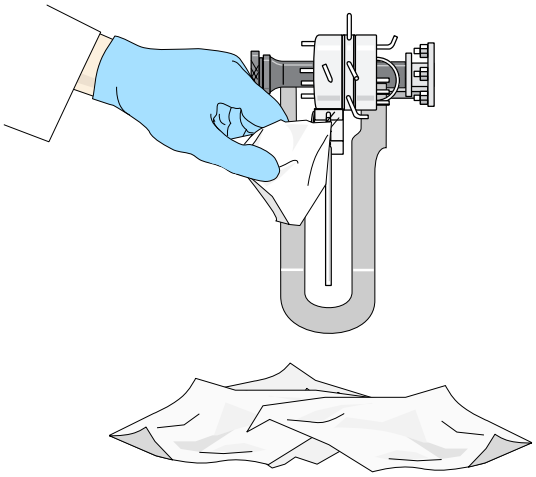
WARNING Biohazardous material might be contained in the BSV and its associated tubing and could cause contamination unless handled with care. Avoid skin contact. Clean up spills immediately in accordance with acceptable laboratory procedures.

1. Put the instrument in STANDBY using the Standby/Reset switch.
2. Open the upper front door.

3. Cover the area under the BSV with several paper towels. Clean the outside with distilled water.



4. Dry the area with lint-free tissues.



5. Close the upper front door.

6. Return the Standby/Reset switch to the READY position.

3.4 CYCLE BSV

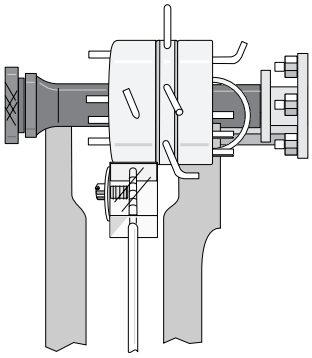
Use this procedure if the BSV is binding or exhibits irregular motion.

1. Open the upper front door.

2. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ BSV Tests ▸▸ Cycle BSV.**

   Press Enter.

   Watch for smooth action. If the BSV continues to move irregularly or to bind, call your Beckman Coulter Representative.



3. Close the upper front door.

3.5 CLEAN CASSETTES

WARNING Risk of blood spills occurs when tubes fall or are pierced off center. Buildup of debris and crystals (dried bleach, blood, diluent) can prevent the tubes from being held firmly in a Universal Cassette. This can cause the tubes to fall out of the cassette or be pierced off center. After cleaning cassettes, always rinse them thoroughly with water.

When you see crystal or blood buildup on a cassette:

1. Wash the cassette with soap or a 10% bleach solution (1 part 5% sodium hypochlorite with 9 parts distilled water).
2. Thoroughly rinse the cassette with warm tap water.
3. Examine to be sure all crystals and debris buildup are eliminated.

3.6 CLEAR FLOW CELL CLOG

Error Messages

PC1 - Partial Clog 1

This indicates partial aperture (flow cell) and sample line clogs. A purge cycle occurs at the end of the cycle if PC1 is detected. Five-part diff results are not displayed. At the end of the third consecutive PC1, PC2 or FC error, the system halts.

PC2 - Partial Clog 2

This indicates clogs in the sheath system. A purge cycle occurs automatically when PC2 is detected. Five-part diff results are not displayed. At the end of the third consecutive PC1, PC2 or FC error, the system halts.

FC - Full Clog

This indicates a flow cell aperture clog only. A purge cycle automatically occurs when FC is detected. Five-part diff results are not displayed. At the end of the third consecutive PC1, PC2 or FC error, the system halts.

Clearing Procedure

Follow these steps to manually unclog the flow cell aperture.

1. Select **Sample Analysis ▸▸ Run Samples.**
   a. Press F7 **PURGE.** Wait. Press F7 again. Wait. Press F7 again. Wait.
   b. Press F2 **START PRIMARY** and cycle a normal whole blood sample in the Primary mode. If the error message recurs, continue to step 2.
2. Press F9 **Exit** then:
   a. Select **Controls ▸▸ Control Run.**
   b. Press F2 **File.**
   c. Select a Latex file.
   d. Press F3 **Run** then F4 **PRIMER**.
   e. Aspirate a solution of one part high-quality, fragrance-free bleach and one part distilled water.
   f. Aspirate distilled water.
3. Cycle a normal whole blood sample. If the error message recurs, call your Beckman Coulter Representative.

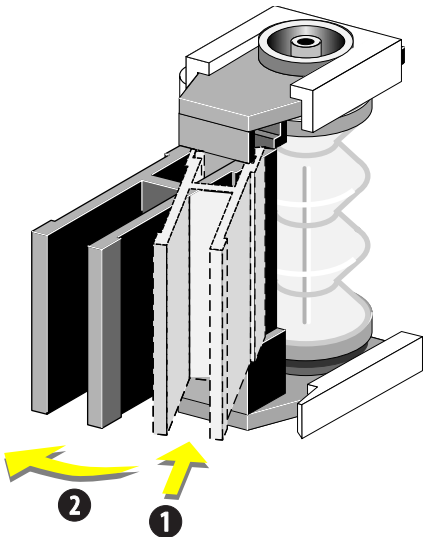
3.7 CLEAN NEEDLE FORWARD SENSOR

Clean the needle forward sensor when it is the corrective action for a related error message.

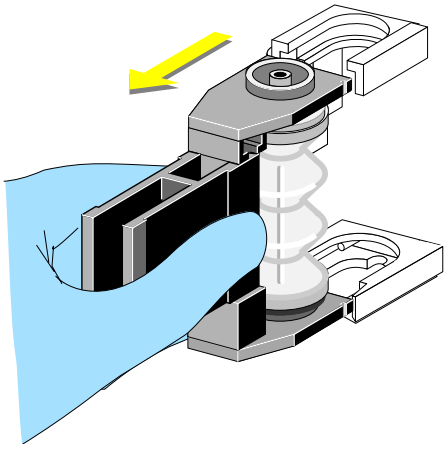
1. Bleach the aspiration system.
   a. Put one part high-quality, fragrance-free bleach (5% sodium hypochlorite) and one part distilled water in a cap-pierce tube.
   b. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Fluidic Tests ▸▸ Clean Needle.**
   c. Press Enter.
   d. Follow the screen instructions.
2. Put the instrument in STANDBY using the Standby/Reset switch.
3. Turn OFF the instrument using the On/Off switch on the back.
4. Unplug the power cord from the wall.
5. Open the upper then lower front doors.

WARNING Skin puncture from the needle, which might contain biohazardous material, could occur. Handle the needle cartridge with extreme care. Always use the safety clip to remove and install the needle cartridge.

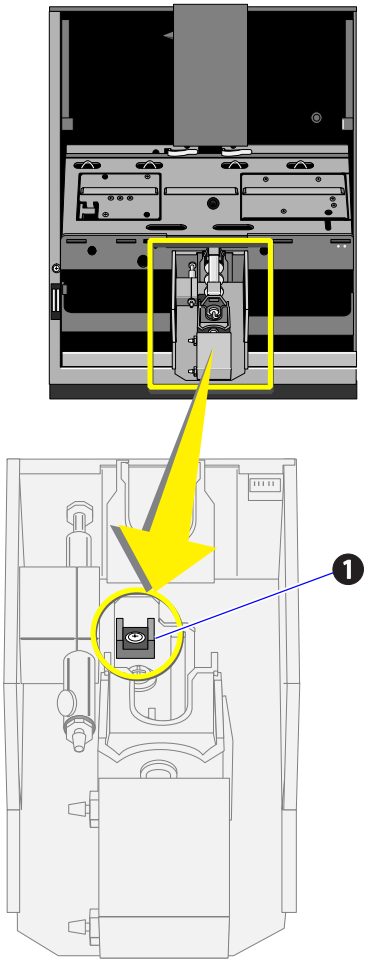
6. Attach the safety clip to the front support of the needle cartridge.
   a. Without squeezing the safety clip, fit the right edge of the safety clip into the groove on the right side of the front support of the needle cartridge ❶.
   b. Slide the safety clip to the left ❷ until its left edge snaps into the groove on the left side of the front support of the needle cartridge with a click.
   c. Check that the safety clip is securely attached to the needle assembly.



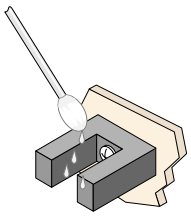
7. Pull out the needle cartridge and set it aside, being careful not to crimp any of the tubing. You do not need to disconnect any of the tubing.



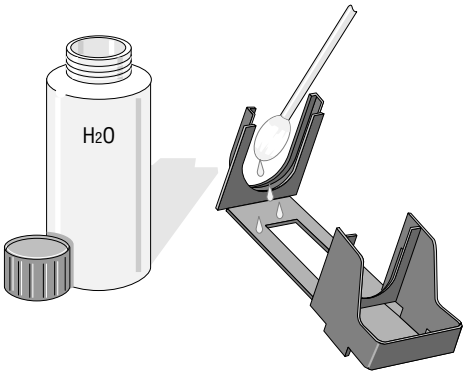
8. Locate the needle forward sensor ❶.



9. Dip a swab in distilled water and gently wipe the sensor with it.

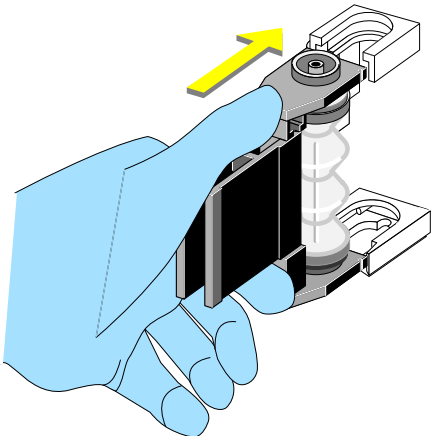


10. Use a swab and distilled water to clean the upper and lower grooves where the needle assembly fits.

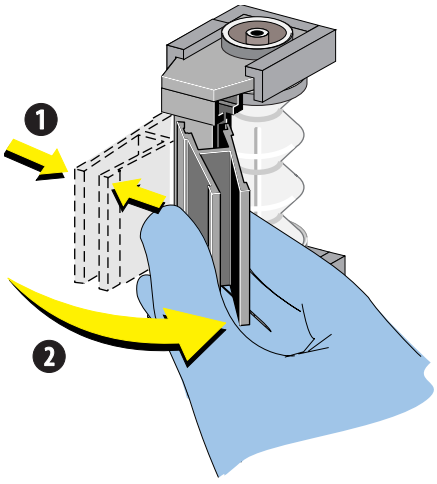


11. Replace the needle cartridge. Slide it into the grooves until it clicks in place.

    Note: The silver lock spring at the bottom of the needle assembly is slightly raised when the needle assembly is properly inserted.



12. Remove the safety clip.
    a. Slightly squeeze the safety clip to move it a little to the right to separate the left side of the clip from the needle assembly ❶.
    b. Continue to move the clip to the right ❷ to free it from the needle assembly.



13. Close the lower and upper front doors.

14. Plug the power cord back into the wall.
15. Return the On/Off switch to ON.
16. Return the Standby/Reset switch to the READY position.

3.8 CLEAN SURFACES

Clean the external and internal surfaces of the instrument with a damp cloth and distilled water. Wipe up reagent spills promptly. This prevents the buildup of corrosive deposits.

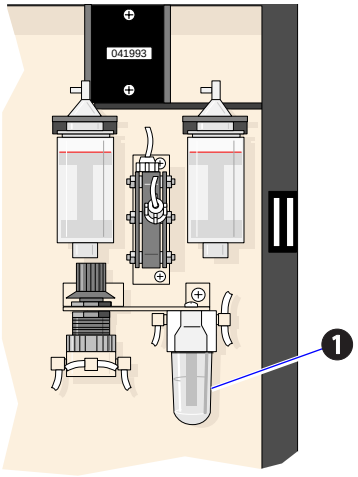
3.9 CLEAN VACUUM TRAP

WARNING The vacuum trap might contain residual biohazardous materials and could cause contamination unless handled with care. Wear protective gear. Avoid skin contact. Clean up spills immediately. Dispose of the contents in accordance with your local regulations and acceptable laboratory procedures.

If you see:

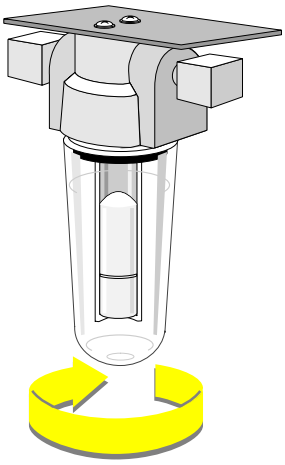
- A warning message that the high vacuum is out of range, and
- The vacuum trap ❶ has foam or liquid in it, then

perform the following procedure:

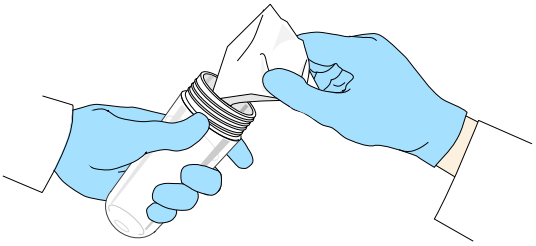


1. Put the instrument in STANDBY using the Standby/Reset switch.
2. Open the right side door.

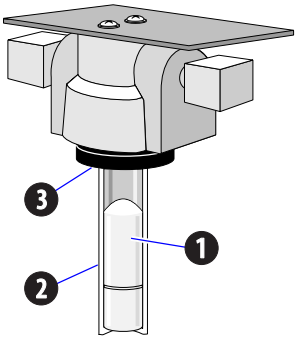
3. Unscrew and remove the clear trap bottom.



4. Rinse it out with distilled water.
5. Dry with a lint-free tissue.

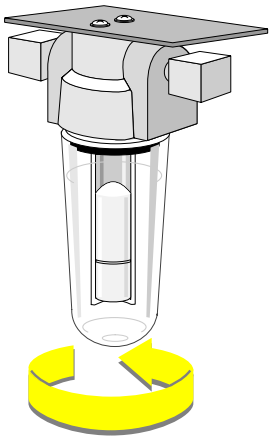


6. Check that
   a. The white center post ❶ is not stuck in the up position.
   b. The white outer post ❷ seats firmly against the black grommet ❸.



7. Making sure the threads are properly seated, screw the trap bottom back on, firmly.

   Note: Do not overtighten.



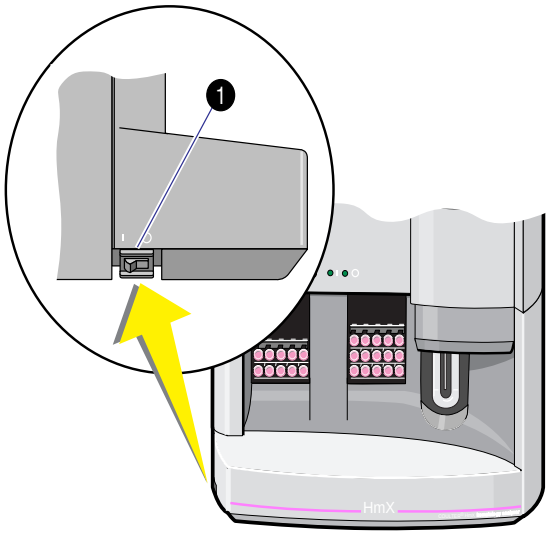
8. Close the right side door.

9. Return the Standby/Reset switch to the READY position.

4.1 RESET THE SYSTEM

To reset the system:

1. Put the Standby/Reset switch in the STANDBY position.
2. Wait 15 seconds.
3. Return the Standby/Reset switch to the READY position.



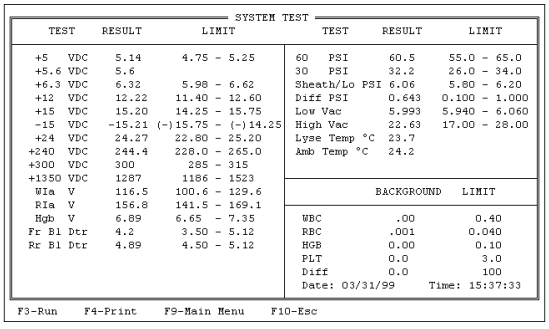
4.2 SYSTEM TEST

Use this procedure to check voltages, blood detectors, pressures, vacuums, temperatures and backgrounds. The system test cycle consists of three separate system test runs followed by a background count. Make sure all doors and panels are closed if you want a valid background count.

1. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ System Test.**
2. Press Enter.

   Note: The results displayed when the screen is accessed are not from Startup. These results are from the previous System Test. Note the date and time at the bottom right of the screen.
3. Press F3 **Run**.

   Any result that is out of limits appears in red.



4.3 JAMMED CASSETTE REMOVAL

1. With the Main menu displayed, press Ctrl+C.

   If this clears the bed, resume operation.

2. If step 1 did not clear the bed:

   a. Put the instrument in STANDBY using the Standby/Reset switch.

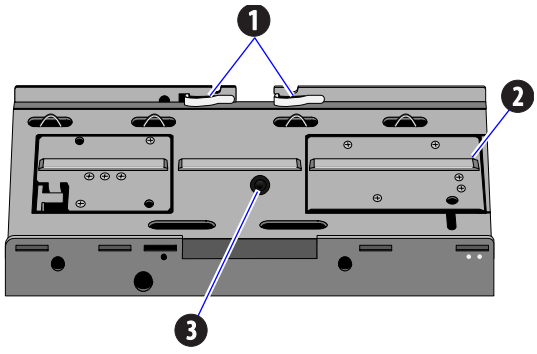
   b. Turn OFF the instrument using the On/Off switch on the back.

   c. Unplug the power cord from the wall.

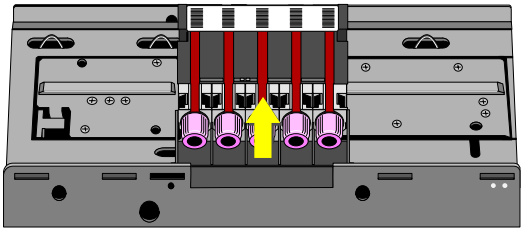
3. Open the upper then lower front doors.

CAUTION Sensor damage can occur if the cassette is moved to the right on the rocker bed. Only move a cassette to the left.

4. Rotate the rocker bed forward to the pierce position.
5. Slide the cassette to the left side of the bed and lift the cassette off the bed. If the cassette does not move easily, go to step 8.
6. If there is a second cassette on the bed, repeat step 5.
7. If this clears the rocker bed, make sure the guide rail ❷, cone-shaped tube available sensor ❸ in the middle of the rocker bed and the two springs ❶ in the back of the rocker bed are not damaged. If damaged, STOP, call your Beckman Coulter Representative. If not damaged, go to step 10.



8. If you were unable to clear the rocker bed:
   a. Try to slightly raise the front of the cassette.
   b. Very gently, push the cassette toward the back of the rocker bed.
   c. Lift the cassette up. You will hear a click.



9. If this procedure clears the bed, make sure the guide rail, cone-shaped tube available sensor in the middle of the bed and the two springs in the back of the bed are not damaged. If damaged, STOP, call your Beckman Coulter Representative.

   If you are still unable to remove the cassette from the bed, call your Beckman Coulter Representative.

10. Close the lower and upper front doors.

11. Plug the power cord back into the wall.
12. Return the On/Off switch to ON.
13. Return the Standby/Reset switch to the READY position.
14. Put a tube in a cassette and place the cassette in the loading bay.
    Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Autoloader Tests ▸▸ Autoloader Test Routine.**

    Follow the instructions displayed on the screen.
15. Resume operation if no problems are reported on the screen. If an error displays, call your Beckman Coulter Representative.

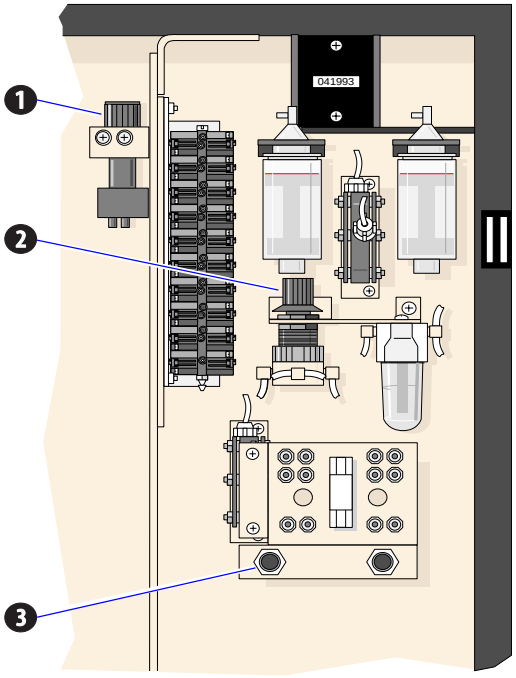
4.4 ADJUST PRESSURE AND LOW VACUUM

If you see a 60 psi, high vacuum or Diff psi message, call your Beckman Coulter Representative.

If you see a low vacuum, 30 psi or sheath pressure error message:

1. Open the right side door.

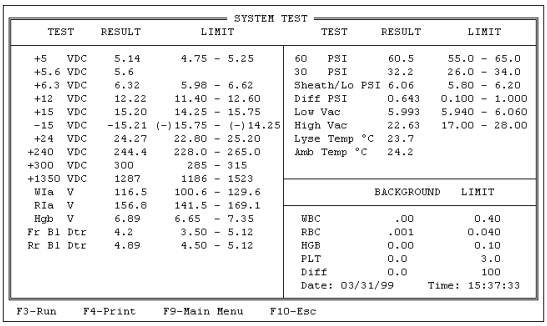
2. Find the correct adjustment knob.
   - ❶ LOW VACUUM
   - ❷ 30 PSI
   - ❸ SHEATH PRESSURE



3. Do a System Test.
   a. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ System Test.**
   b. Press Enter.
   c. Press F3 **Run**.

4. Watch the System Test reading. When INV changes to a numeric reading, turn the knob slowly
   - clockwise to increase or
   - counterclockwise to decrease.

   Note: Only turn the knob when there is a numeric reading. You have three opportunities to adjust the numeric reading during a System Test cycle.
5. If you do not get the proper adjustment the first time, press F3 **Run** to repeat the System Test cycle.
6. Once you have made the correct adjustment, press F3 **Run** to confirm your adjustment.
7. Close the right side door.



4.5 OPTIMIZE THE DMS HARD DISK

The HmX Hematology Analyzer is equipped with the OPTune™ utility, a software utility that optimizes the hard disk of the DMS. Optimizing organizes files on your hard disk so that the DMS is faster and more efficient.

The OPTune utility performs three types of optimization: daily, weekly and monthly. The type it uses depends on how long it has been since you last reset your HmX Hematology Analyzer. The program keeps track of how long it has been between optimizations and performs only the functions necessary for that time period. When you have the OPTune utility enabled, the system runs the OPTune utility each time you reset your HmX Hematology Analyzer, but it will not optimize more than once a day.

Daily

The fastest method (less than a minute), this type leaves each file

- 100% defragmented
- sorted in ascending order by name
- in contiguous order.

Weekly

Takes about 50% longer than the daily method. Does everything the daily method does, plus it optimizes in the packed mode. It arranges the files on your hard drive so that they are end-to-end, with no space between them. Thus, new files are likely to be written to disk without being fragmented.

Monthly

CAUTION Damage to the disk drive or data loss could occur if power is lost or interrupted during the optimization procedure. Try to schedule this procedure when there is little likelihood of power interruption.

The most thorough method. Does everything the weekly method does, plus it physically arranges files on the disk in the same order as the sorted directory entries. This method takes longer, but increases efficiency when accessing many files in sequential order.

The OPTune utility initially takes about 45 minutes to an hour to optimize the hard drive. After that, daily optimization takes about 30 to 40 seconds. The OPTune utility reorganizes only those files that need it; it does not reoptimize unnecessarily.

If there is a hard disk failure during the optimization process, for example lost clusters or cross-linked files, the OPTune utility prompts you to continue. Answer Yes to go on with the process. However, if this happens more than once a week, record the incident in your DMS maintenance log or your logbook and call your Beckman Coulter Representative.

To enable the OPTune utility so that it automatically optimizes the hard disk when you reset the system:

1. Select **Special Functions ▸▸ Set Up ▸▸ System Set Up ▸▸ Optimize Hard Disk**.
2. Enter Supervisor Password.
3. The system asks:

   Do you want to automatically optimize the Hard Disk during powerup?

   Verify that YES is displayed. If not, Press Spacebar to toggle to YES.
4. Press F10 **Save/Esc**.

If you always leave your system turned on, we recommend that you use the Reset the System procedure at least once a week allow the OPTune utility to run. See Heading 4.1, RESET THE SYSTEM.

When you reset the system, these DMS functions default to these conditions:

- Data Base storage: ON
- XB: ON
- AutoPrint: NONE
- AutoTransmit: OFF

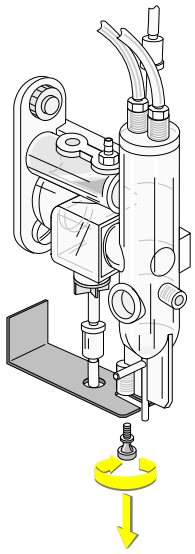
Adjust the setting of these options as needed according to your laboratory's protocol.

4.6 REPLACE APERTURE BLOCK O-RINGS

This is not a routine procedure. Use it only when troubleshooting.

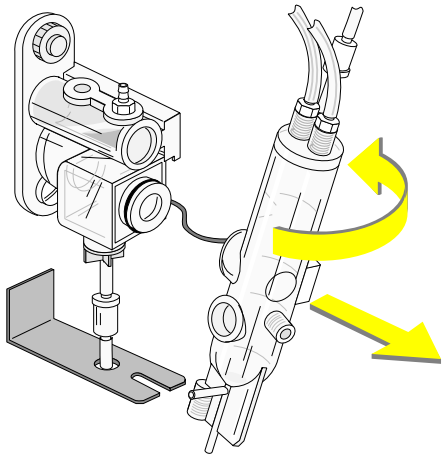
1. Drain the aperture baths:
   a. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Drain and Vent.**
   b. Press Enter and wait until *SELECT FUNCTION* displays.
2. Put the instrument in STANDBY using the Standby/Reset switch.
3. Open the upper front door.

4. Unscrew and remove the retaining screw at the bottom of the bath. Turn screw to the left.

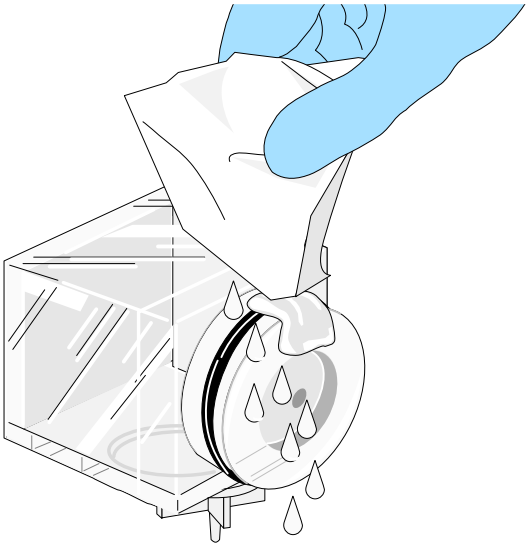


CAUTION Risk of electrical damage to the instrument if the electrode wire is pulled loose. To avoid causing electrical damage, DO NOT pull the electrode wire loose when you rotate the bath to the right. Do not tug or bend it excessively.

5. Gently rotate the bath out and to the right.



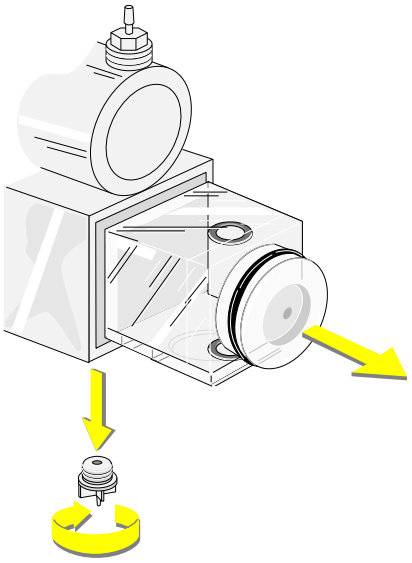
6. Inspect the housing around the O-ring for salt buildup. If there is any, rinse it off with distilled water. Dry it with a lint-free tissue.



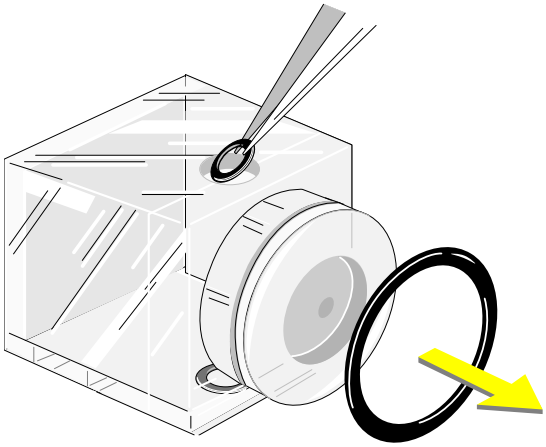
7. Take out the aperture block:
   a. Unscrew the white locking screw under the aperture block.

      Note: For the RBC bath, remove the tubing from the locking screw before unscrewing it.

   b. Pull the aperture block out. Be careful not to touch the aperture.

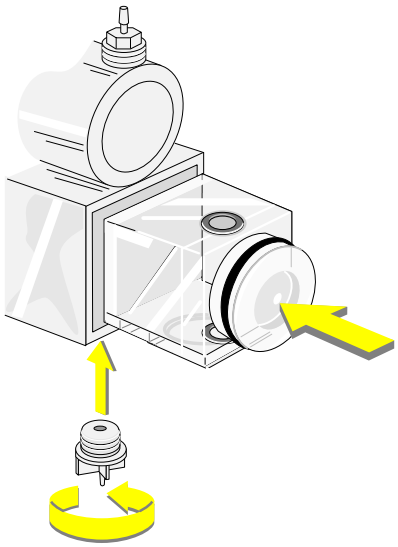


8. Replace all three O-rings.
   - Use tweezers to remove and replace the little ones.
   - Moisten the new O-rings with distilled water before you install them.

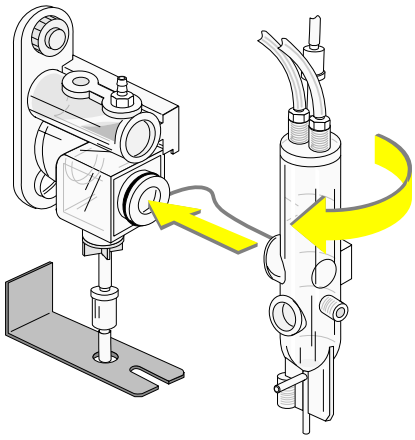


9. Slide the aperture block back in place and tighten the white locking screw.

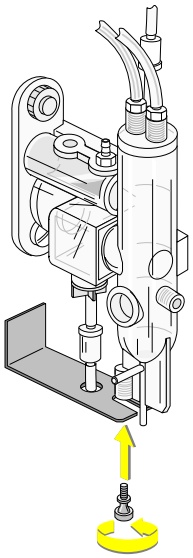
   Note: For the RBC bath, reattach the tubing to the white locking screw after it is screwed in place.



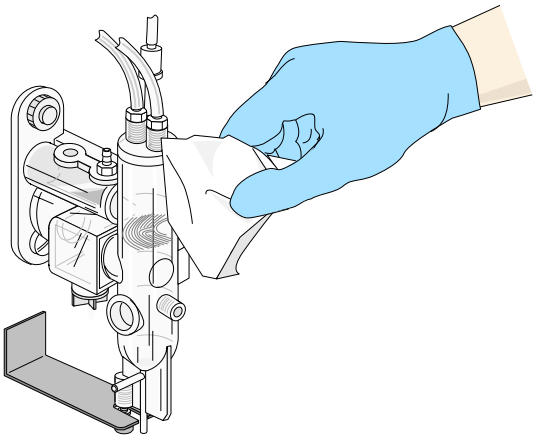
10. Rotate the bath back into position onto the large O-ring. Check for proper sealing all the way around the O-ring.



11. Replace and tighten the retaining screw.



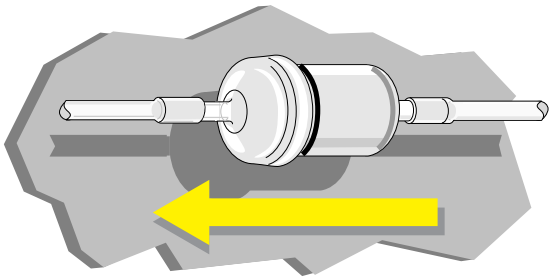
12. Carefully dry the bath assembly and surrounding area with a lint-free cloth.
13. Check for and remove any fingerprints on the WBC bath.



14. Return the Standby/Reset switch to the READY position.
15. Rinse and drain the baths several times to check that the baths do not leak:
    a. Select **Sample Analysis⇤ Run Samples.**
    b. Press F8 **RINSE**. Wait. Press F8 again. Wait. Press F8 again. Wait.
    c. Press Esc then F9 to return to the Main menu.
16. Close the upper front door.
17. Perform Startup.

4.7 REPLACE CHECK VALVES

Check valves allow liquid or air to flow through in one direction only.



Replace a check valve if:

- It is clogged, or
- It lets liquid or air flow both ways.

Table 4.1 explains how to check for and find valves that might be clogged or open so that liquid or air can flow both ways.

Table 4.1 Check Valve Locations, Symptoms of Malfunction

Location	Symptoms When Plugged	Symptoms When Opened
DILUTER FRONT PANEL		
In the 6-psi mixing bubble line to the lower left of the RBC bath.	No mixing bubbles during operating cycle. Erratic RBC and Plt counts.	Liquid in tubing from check valve to solenoid 7.
In the 6-psi mixing bubble line to the lower left of the WBC bath.	No mixing bubbles during operating cycle. Erratic WBC and Hgb results.	Liquid in tubing from check valve to solenoid 8.
In the line from the waste chamber to the outer waste container.	Waste chamber does not drain.	Hesitation in bath drain after count. Possible incomplete draining.
In the RBC drain line to the waste chamber.	RBC bath does not drain.	Possible backflow of drain line contents at the beginning of waste chamber drain. RBC and Plt carryover or background problem.

Table 4.1 Check Valve Locations, Symptoms of Malfunction *(Continued)*

Location	Symptoms When Plugged	Symptoms When Opened
In the WBC bath drain line to the waste chamber.	WBC bath does not drain.	Possible backflow of drain line contents at the beginning of waste chamber drain. WBC and Hgb carryover or background problem.
In the line between the BSV and the Y-connector to the waste chamber.	No diluent enters the waste chamber through this line during draining.	Possible diluent leak between the BSV sections.
In the line at the top of the RBC bath.	No bleach enters the RBC bath during the Bleach the Aperture procedure.	Diluent might leak from check valve if RBC bath is overfilled.
In the line at the top of the WBC bath.	No bleach enters the WBC bath during the Bleach the Aperture procedure.	Diluent might leak from check valve if WBC bath is overfilled.
In the needle waste chamber (VC3) drain line.	Needle Waste Chamber overflows into vacuum trap. Possible needle bellow overflow.	Needle waste chamber drains sluggish because of back pressure in the line.

1. Put the instrument in STANDBY using the Standby/Reset switch.
2. Replace the malfunctioning check valve.
   a. Record the direction in which the valve is pointing while it is still in place.

WARNING Biohazardous material might be contained in the check valves and associated tubing and could cause contamination unless handled with care. Wear protective gear. Avoid skin contact. Clean up spills immediately. Dispose of valve and tubing according to your local regulations and acceptable laboratory procedures.

   b. Position the new check valve next to the old check valve, making sure they are both pointing in the same direction.
   c. Transfer the tubing, one at a time, from the old to the new.
   d. Compare to your drawing. Make sure the new valve is pointing in the correct direction.
3. Return the Standby/Reset switch to the READY position.
4. Cycle a sample. Watch the check valve and ensure it is working properly and does not leak.

4.8 REPLACE FUSES

Use this procedure to replace fuses when a *VDC* (voltage) *OUT OF RANGE* error message displays.

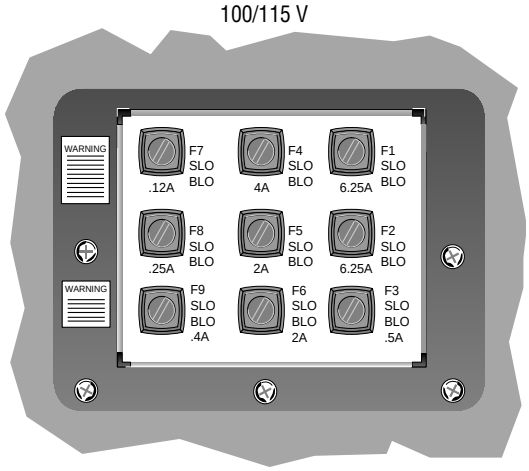
1. Put the instrument in STANDBY using the Standby/Reset switch.
2. Turn OFF the instrument using the On/Off switch on the back.
3. Unplug the power cord from the wall.

WARNING Risk of shock when replacing fuse 10 because the capacitors still carry a charge after the instrument is unplugged. If you are replacing fuse 10, wait 5 minutes to prevent getting shocked.

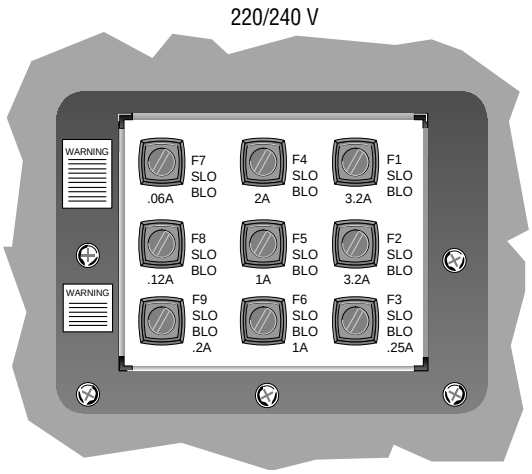
4. Lift the panel up and off the left side of the instrument.

5. Based on the VDC indicated in the error message, identify the correct fuse using the charts below for 100/115 V and 220/240 V. Fuses are labeled as in the illustration.

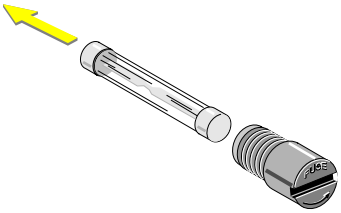
FUSE	FUNCTION
F1, F2	ac
F3	5.6 Vdc
F4	+5, +15, -15 Vdc
F5	+24 Vdc
F6	+12 Vdc
F7	+240 Vdc
F8	+300, 6.3 Vdc
F9	+1350 laser power supply
F10	2.5 A Pneumatic power supply (back of instrument, lower right corner)



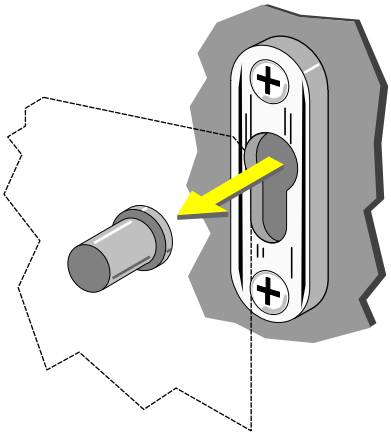
FUSE	FUNCTION
F1, F2	ac
F3	5.6 Vdc
F4	+5, +15, -15 Vdc
F5	+24 Vdc
F6	+12 Vdc
F7	+240 Vdc
F8	+300, 6.3 Vdc
F9	+1350 laser power supply
F10	1.5 A Pneumatic power supply (back of instrument, lower right corner)



6. Unscrew the threaded fuse cap. Pull it out of its hole.
7. Remove the fuse from the cap and inspect it. If the fuse is burned out, replace it with a new one of the same type and rating:
   a. Insert the fuse into the fuse cap.
   b. Screw the fuse cap back in.



8. Rehang the panel:
   a. Line up the panel with the side of the instrument and a little above it.
   b. Pull it down until you catch the four pegs on the panel in the holes on the side of the instrument.
   c. Check that you have caught all four pegs. Be sure you cannot pull the panel out at the bottom.



9. Plug the power cord back into the wall.
10. Return the On/Off switch to ON.
11. Return the Standby/Reset switch to the READY position.

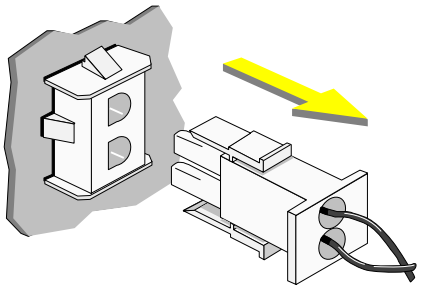
CAUTION If a fuse fails shortly after you put it in, turn OFF the instrument to prevent possible damage to the instrument's electrical system. Unplug the power cord from the wall outlet and call your Beckman Coulter Representative.

4.9 REPLACE HEMOGLOBIN LAMP ASSEMBLY

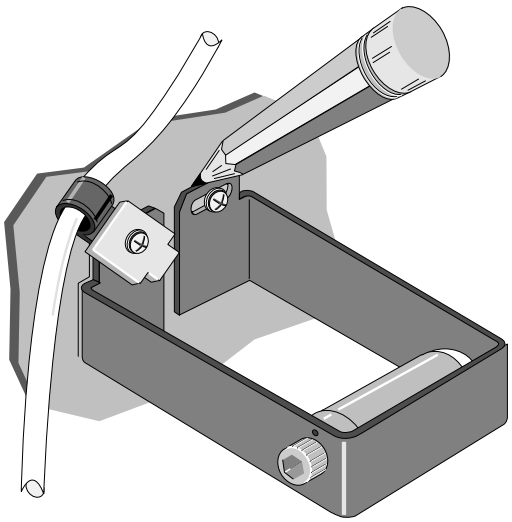
1. Put the instrument in STANDBY using the Standby/Reset switch.
2. Turn OFF the instrument using the On/Off switch on the back.
3. Unplug the power cord from the wall.
4. Open the upper front door.

WARNING if the hemoglobin lamp was lit it will be hot. You might be burned if you touch the lamp while it is hot. Handle the hemoglobin lamp assembly by its bracket only .

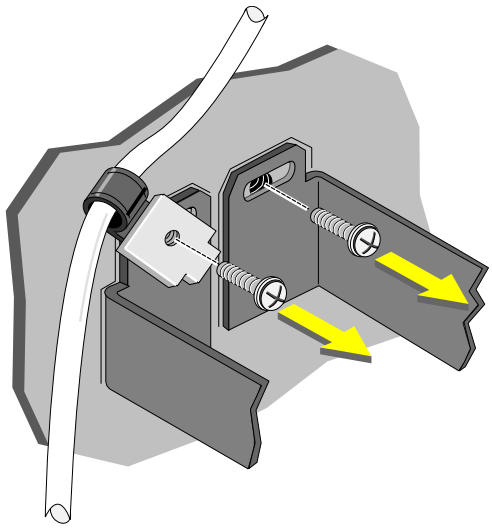
5. Unplug the Hgb lamp connector.



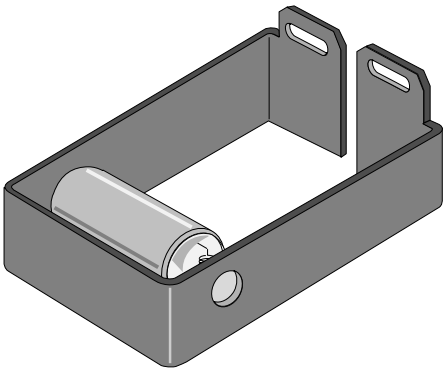
6. Carefully trace around the mounting bracket on the Diluter panel to make it easier to position the new lamp precisely.



7. Remove the two mounting screws that fasten the Hgb lamp assembly to the Diluter panel. Also remove the sweep-flow line bracket attached by the left screw.



8. Replace the Hgb lamp assembly with the new one.



9. Reattach the sweep-flow line bracket, then position the lamp bracket carefully within the traced lines. Replace the screws.
10. Plug in the connector.
11. Close the upper front door.

12. Plug the power cord back into the wall.
13. Return the On/Off switch to ON.
14. Return the Standby/Reset switch to the READY position.
15. Wait 15 minutes.

16. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ HGB Lamp Adjust.**

    Press Enter. Wait.

    - If the DMS displays *OK*, press Esc to continue.
    - If the DMS displays *COULD NOT ADJUST HGB LAMP*, repeat step 16. If the error message recurs, call your Beckman Coulter Representative

17. Perform Startup. Verify that the hemoglobin voltage is in range.

4.10 REPLACE NEEDLE ASSEMBLY

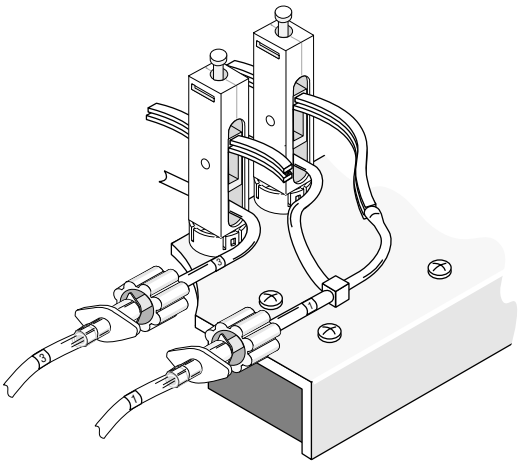
WARNING Biohazardous material might be contained in components in this area and could cause contamination unless handled with care. Wear protective gear and dispose of components in accordance with your local regulations and laboratory mandated safety procedures.

1. Are you replacing the needle because it is bent?
   - If no, go to step 2.
   - If yes, go to step 3.
2. Clean the needle.
   a. Put one part high-quality, fragrance-free bleach (5% sodium hypochlorite) and one part distilled water in a cap-pierce tube.
   b. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Fluidic Tests ▸▸ Clean Needle.**
   c. Press Enter.
   d. Follow the screen instructions.
3. Bleed residual pressure from the system.
   a. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Drain & Vent.**
   b. Press Enter.
   c. Wait until *SELECT FUNCTION* displays.

WARNING Risk of puncture by the needle in the cartridge. Assure that proper technique is used to prevent needle puncture. Only users trained by Beckman Coulter personnel should replace the needle. Use the following replacement procedure.

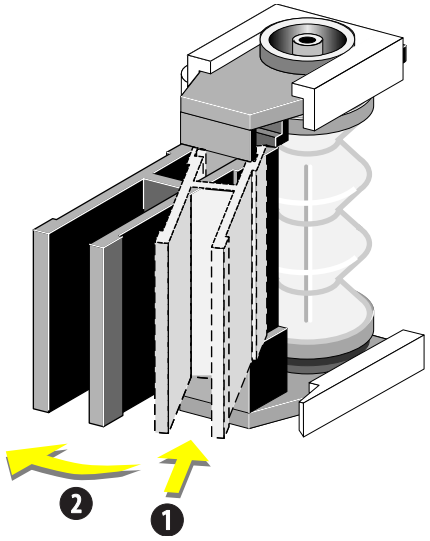
4. Put the instrument in STANDBY using the Standby/Reset switch.
5. Turn OFF the instrument using the On/Off switch on the back.
6. Unplug the power cord from the wall.
7. Open the upper then lower front doors.

8. Twist and disconnect the white fittings of needle tubing 1 and 3.

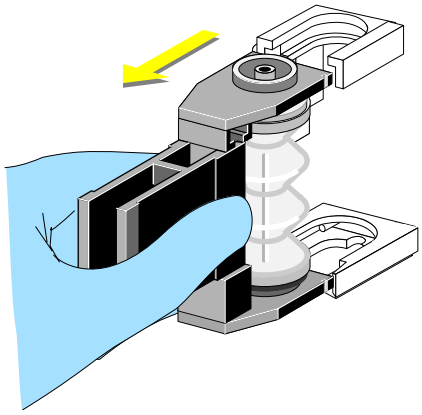


WARNING The needle is very sharp. The used one might contain biohazardous material. Handle the needle cartridge with extreme care. Always use the safety clip to remove and install the needle cartridge. This protects you from possible needle puncture.

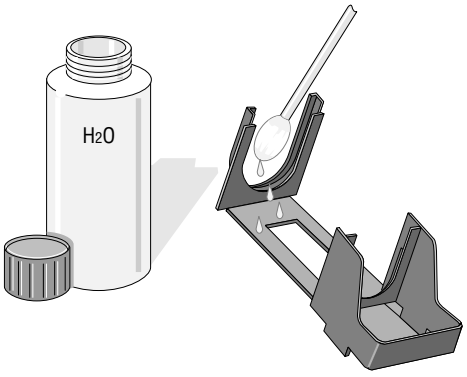
9. Attach the safety clip to the front support of the needle cartridge.
   a. Without squeezing the safety clip, fit the right edge of the safety clip into the groove on the right side of the front support of the needle cartridge ❶.
   b. Slide the safety clip to the left ❷ until its left edge snaps into the groove on the left side of the front support of the needle cartridge with a click.
   c. Check that the safety clip is securely attached to the needle assembly.



10. Pull out the needle cartridge.

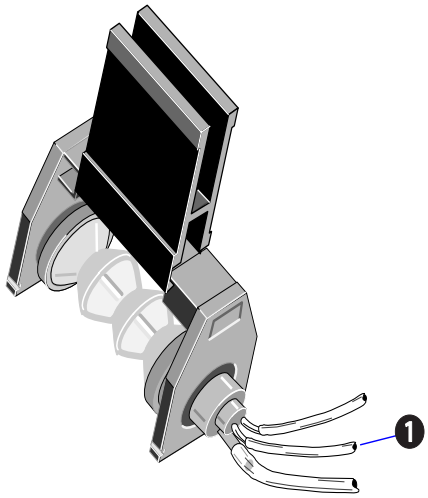


11. Use a cotton swab and distilled water to clean the upper and lower grooves where the needle assembly fits.



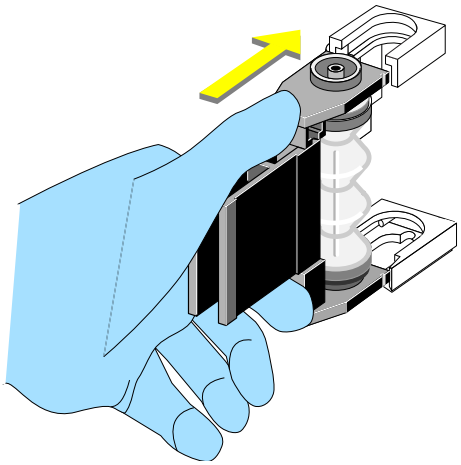
WARNING Risk of puncture by the needle in the cartridge. During this procedure, always direct the needle cartridge opening away from your person to prevent accidental injury. A safety clip comes attached to the new needle cartridge. If the safety clip is missing, attach one to the new needle cartridge before proceeding.

12. Remove the Aspiration Line ❶ from the center fitting on the old needle assembly. Use pliers to push the line up and off of the fitting. Be careful not to cut the tubing.
13. Transfer the Aspiration Line to the center fitting on the new needle assembly.
14. Dispose of the used needle assembly according to your laboratory's protocol.

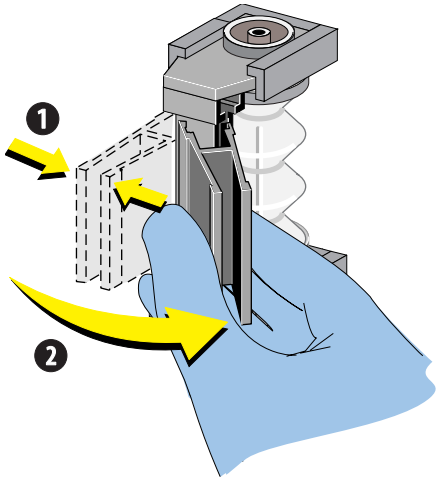


15. Slide in the new needle cartridge until it clicks into place.

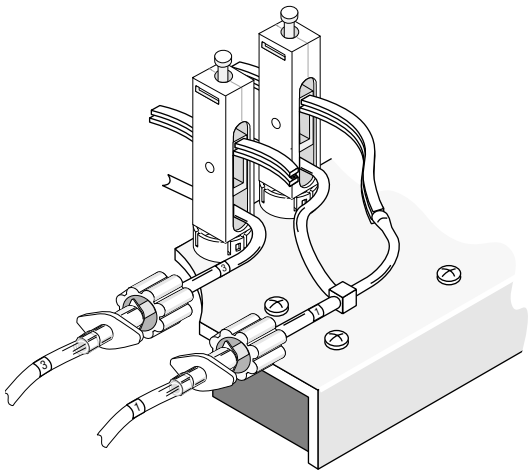
    Note: The silver lock spring at the bottom of the needle assembly is slightly raised when the needle assembly is properly inserted.



16. Remove the safety clip.
    a. Slightly squeeze the safety clip to move it a little to the right ❶ to separate the left side of the clip from the needle assembly.
    b. Continue to move the clip to the right ❷ to free it from the needle assembly.



17. Connect the fittings of new needle tubings 1 and 3.



18. Close the lower and upper front doors.

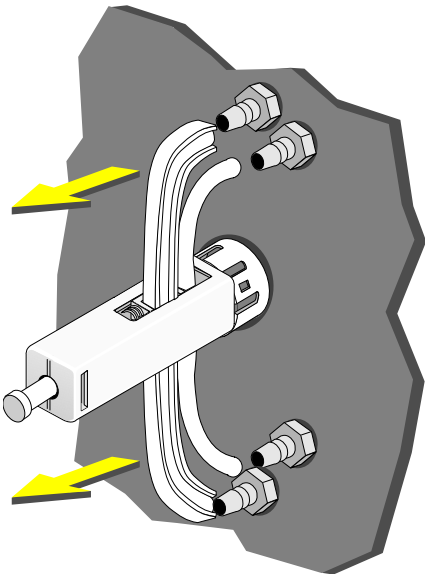
19. Plug the power cord back into the wall.
20. Return the On/Off switch to ON.
21. Return the Standby/Reset switch to the READY position.
22. Cycle a whole blood sample with known results to verify proper installation of the needle.

4.11 REPLACE PINCH VALVES

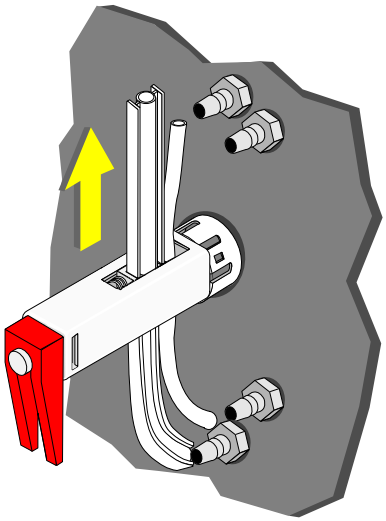
This is not a routine procedure. Do this only when directed to by a Beckman Coulter Representative.

Note: Pinch valve numbers are printed next to each valve.

1. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Drain and Vent.**
2. Press Enter and wait until *SELECT FUNCTION* displays.
3. Put the instrument in STANDBY using the Standby/Reset switch.
4. Make a drawing of the path the tubing takes through the nonfunctioning valve.
5. Remove the old pinch valve:
   a. Disconnect the tubing that goes through the pinch valve from their fittings.

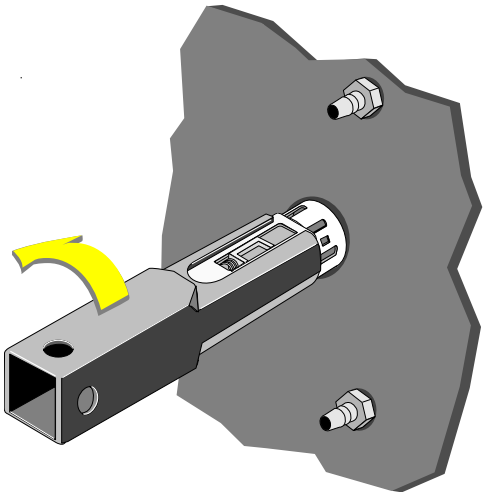


b. Pull the tubing out of the pinch valve. Use a deactivator clip to hold open the pinch valve when removing the I-beam tubing.



c. Remove the deactivator clip.

d. Using the pinch valve wrench, turn the pinch valve about 1/4-turn until it snaps out.



6. Install tubing in new pinch valve:
   a. Use a deactivator clip to hold open the pinch valve.
   b. Thread the I-beam tubing through the pinch valve.
   c. Remove the deactivator clip.
   d. If there is a second piece of tubing, thread it through the opening in the pinch valve.

7. Install the new pinch valve:
   a. Line it up to start the twist 1/4-turn from where you want the valve to end.
   b. Push in and turn the valve until it seats.
   c. Attach the tubings to the fittings. Check the drawing you made in step 4. Make sure the tubing is properly routed.
8. Return the Standby/Reset switch to the READY position.
9. Perform Startup.
10. Run a cycle. Make sure that the new pinch valve is correctly connected and there are no leaks.

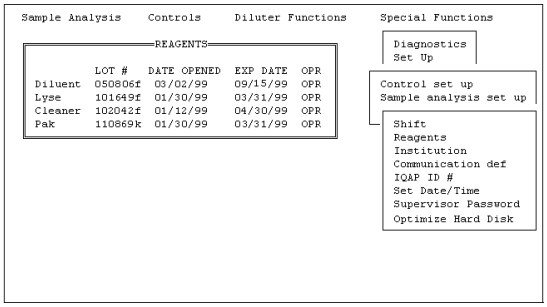
4.12 REPLACE REAGENT CONTAINERS

IMPORTANT Contact or proximity could cause elevated background counts. Keep reagent lines away from electrical lines or apparatus.

1. Record the new reagent information:
   a. Select **Special Functions ▸▸ Set Up ▸▸ System Set Up ▸▸ Reagents.**
   b. Key in the new reagent information, pressing Enter after each item:
      - lot number
      - date reagent opened

        Note: Pressing Enter automatically gives you today's date.
      - expiration date

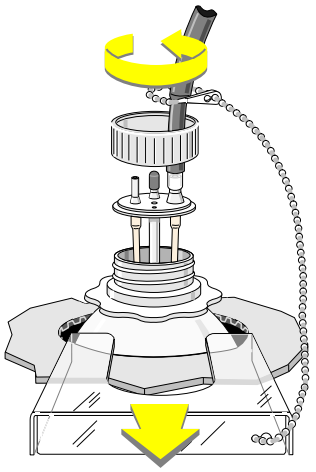
        Note: Do not forget to enter revised expiration dates where appropriate, for example, 60 days from date opened for Lyse and Pak, 90 days for Cleaner.
   c. Press F10 to save the data and leave the reagent screen.
   d. Press F9 to return to the Main menu.



IMPORTANT Pooling could cause contamination and elevated background counts. Do not pool reagents.

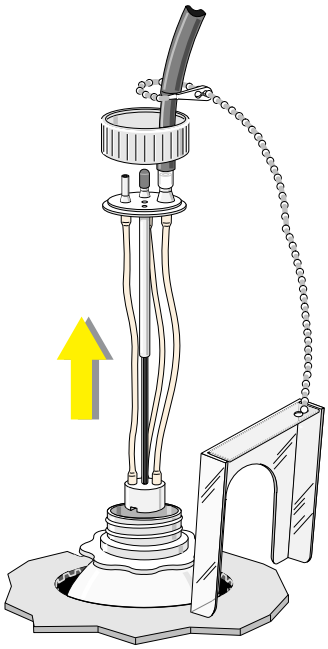
2. Turn OFF the compressor.
   a. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Fluidics Tests ▸▸ Compressor ON/OFF.**
   b. Press Enter.
   c. Press Spacebar to select OFF.
   d. Press Enter.

   Note: Do not cycle the instrument during this procedure.
3. Open the new reagent container.
4. Unscrew the pickup tube assembly cap and slide the collar off the old reagent container.

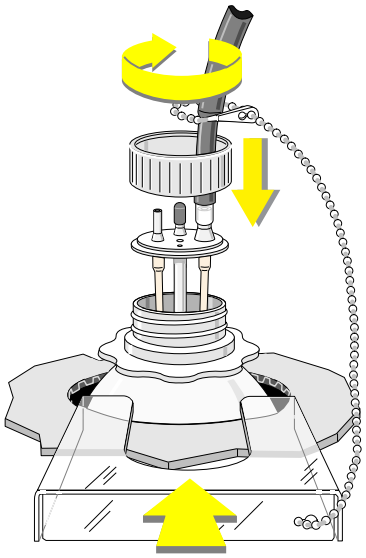


5. Lift the assembly straight up and out. Be careful not to touch the lower part of the assembly or let it touch any lab surfaces.

   Note: If the lower part of the assembly does touch anything, flood with distilled water then wipe with a lint-free tissue.



6. Transfer the pickup tube assembly to the new reagent container and secure it.
   a. Carefully put the pickup tube assembly straight into the new reagent container and screw the cap in place.
   b. Slide on the collar.
   c. Tighten the cap.



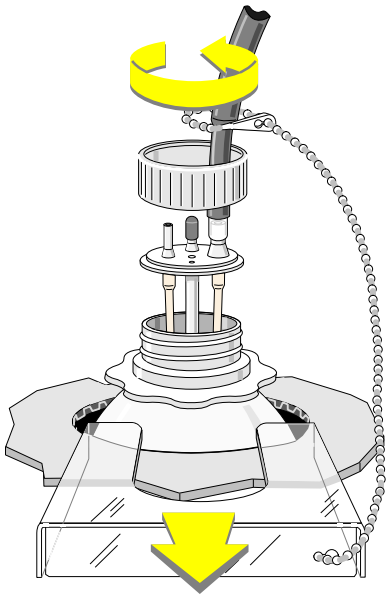
7. Prime the lines.
   a. Select **Diluter Functions ▸▸ Prime Reagents.**

      and the reagent you have replaced.
   b. Press Enter.
8. Once priming is complete, press F9 to return to the Main menu. Continue normal operation.

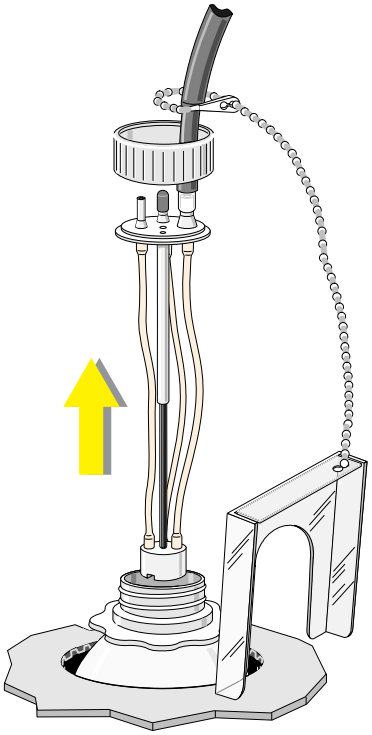
4.13 REPLACE REAGENT PICKUP TUBES

1. Turn OFF the compressor.
   a. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Fluidics Tests ▸▸ Compressor ON/OFF.**
   b. Press Enter.
   c. Press Spacebar select OFF.
   d. Press Enter.

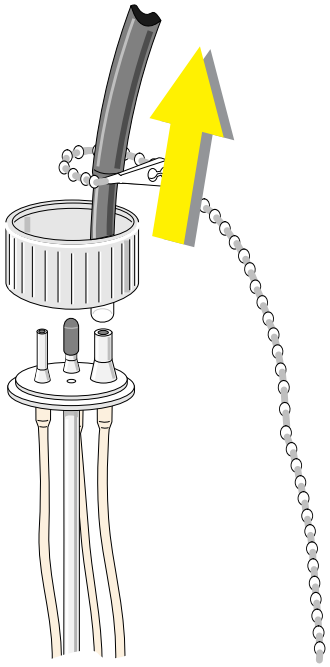
   Note: Do not cycle the instrument during this procedure.
2. Unscrew the pickup tube assembly cap and slide the collar off the reagent container.



3. Carefully lift the assembly from the container. Wait while the liquid from the tubing runs into the container.

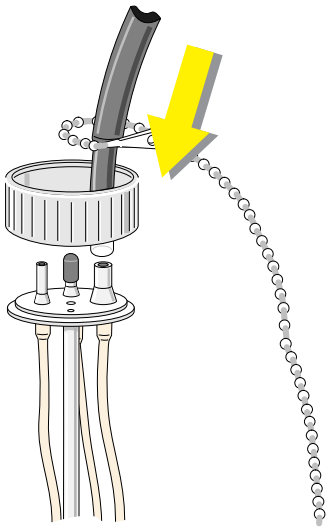


4. Remove the tubing from the top of the old pickup tube assembly.

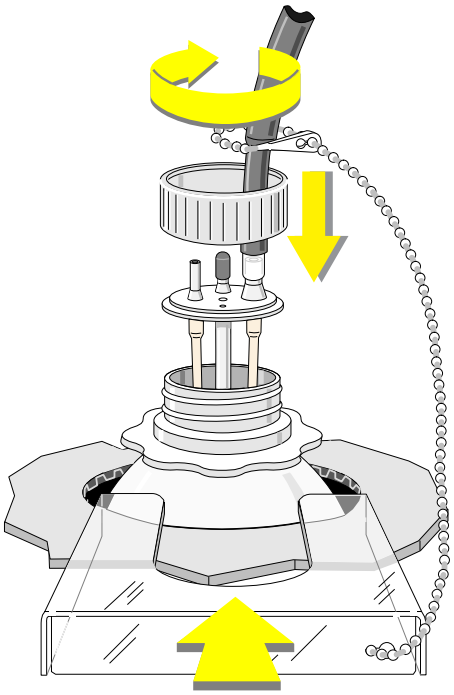


5. Attach the tubing to the top of the new pickup tube assembly. Be careful not to touch the lower part of the new assembly or let it touch any lab surfaces.

   Note: If the lower part of the new assembly does touch anything, flood with distilled water then wipe with a lint-free tissue.



6. Secure the new pickup tube assembly to the reagent container.
   a. Carefully put the pickup tube assembly straight into the reagent container and screw the cap in place.
   b. Slide on the collar.
   c. Tighten the cap.



7. Check for leaks:

   a. Select **Diluter Functions ▸▸ Prime Reagents.**

      and the reagent that corresponds to the pickup tube you replaced.

   b. Press Enter.

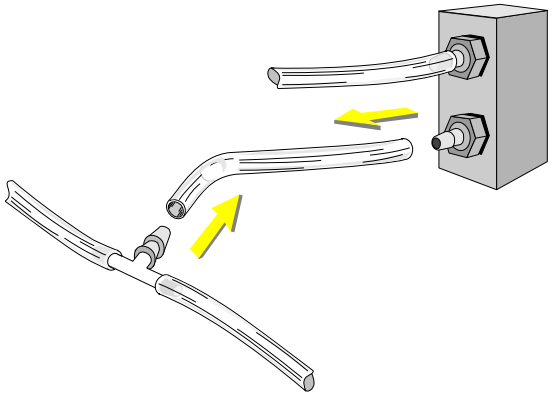
   c. During the prime, check the tubing connection for leaks.

8. Once priming is complete, press F9 to return to the Main menu. Continue normal operation.

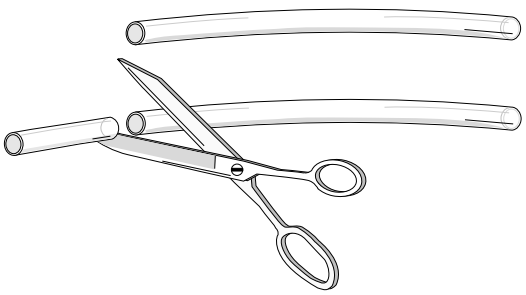
4.14 REPLACE TUBING

Replace tubing if it is cracked, leaking, or has lost resilience at the pinch valves.

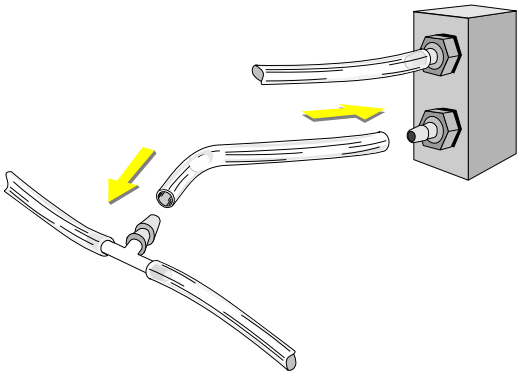
1. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Drain and Vent.**
2. Press Enter and wait until *SELECT FUNCTION* displays.
3. Put the instrument in STANDBY using the Standby/Reset switch.
4. Pull the tubing section from the two components it connects.



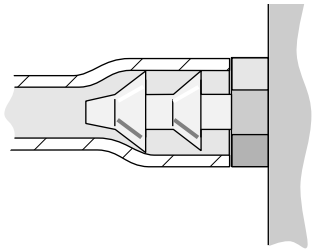
5. Measure new tubing of the same material, color code and bore size of the old tubing you just pulled off.



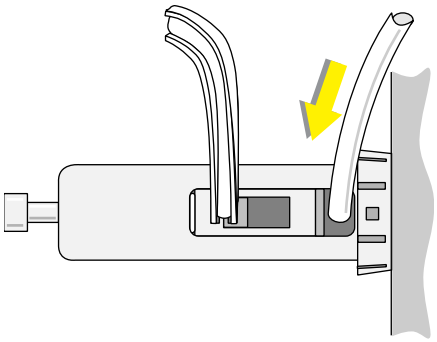
6. Push new tubing onto the two components it is to connect.



If you are replacing tubing onto a barbed fitting, be sure that the tubing goes over both barbs.

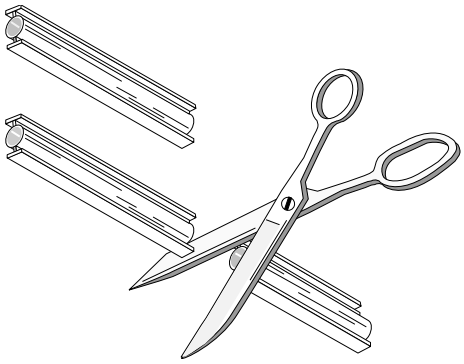


If you are replacing the round (normally open) tubing in a pinch valve, remember to thread it through the end opening.

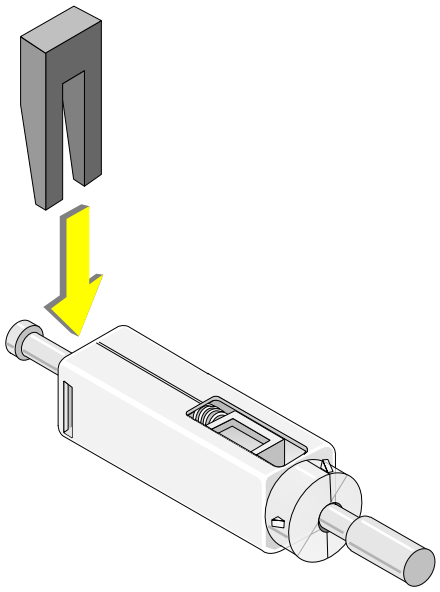


If you are replacing I-beam tubing:

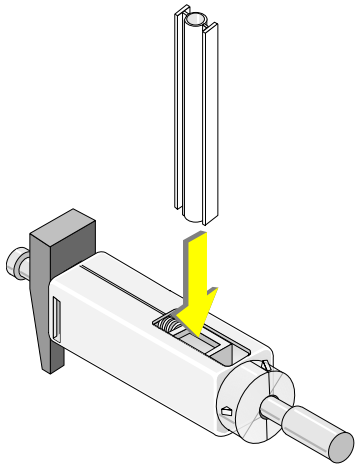
a. Cut new tubing the same length as the old tubing.



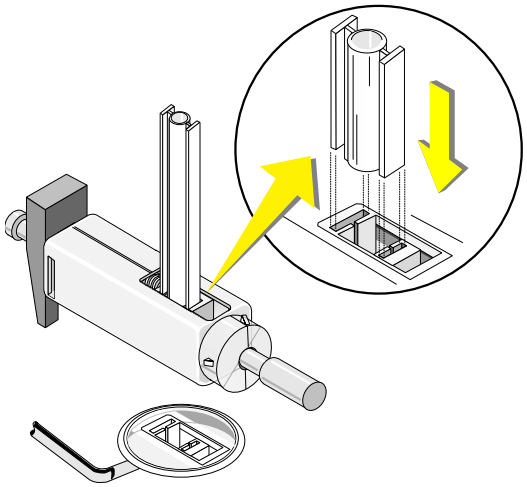
b. Pull out the center rod of the pinch valve. Insert a deactivator clip to wedge the channel open.



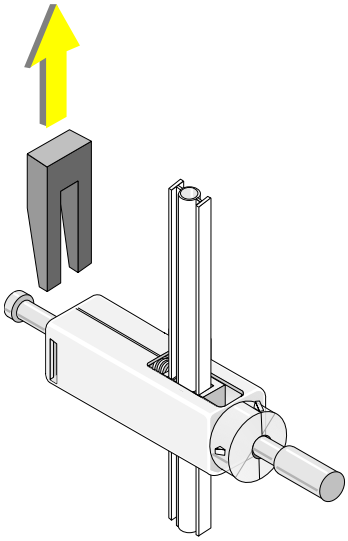
c. Thread the tubing straight down through the pinch valve.



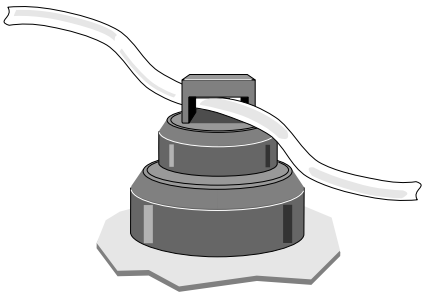
d. Inspect the tubing to see if it is correctly threaded through both the top and bottom of the pinch valve. Use the dental mirror supplied with your HmX Hematology Analyzer.



e. Take the deactivator clip off the pinch valve.



If you are replacing tubing that goes through a button pinch valve, just push the tubing through.

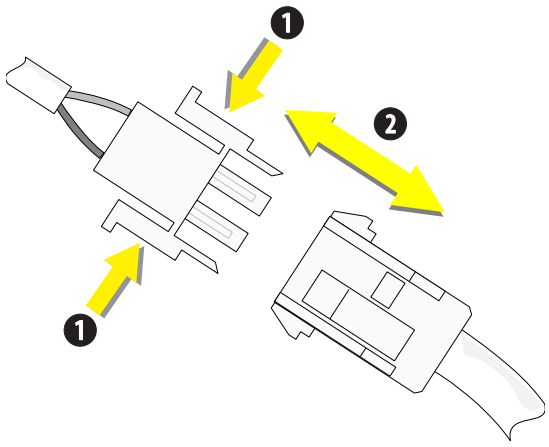


7. Return the Standby/Reset switch to the READY position.
8. Perform Startup.
9. Run a cycle. Make sure the new tubing is correctly connected and does not leak.

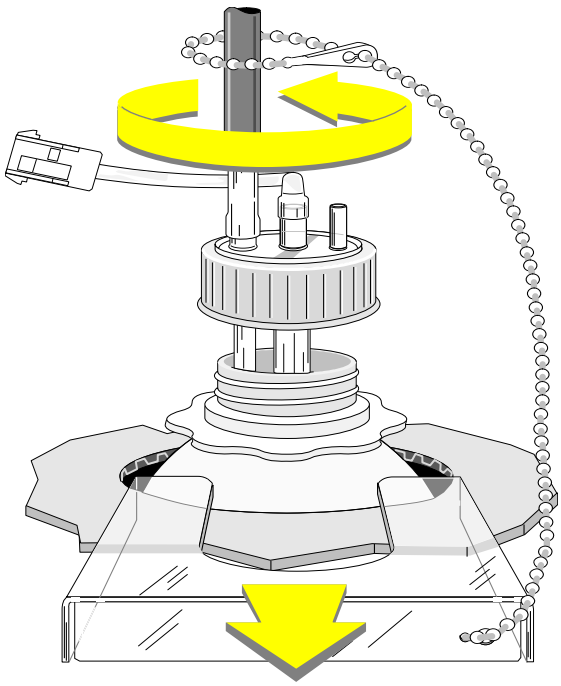
4.15 REPLACE WASTE ASSEMBLY

WARNING Biohazardous contamination could occur from contact with the waste assembly and its associated tubing if not handled with care. Wear protective gear. Avoid skin contact. Clean up spills immediately. Dispose of the contents of the waste container according to your local regulations and acceptable laboratory procedures.

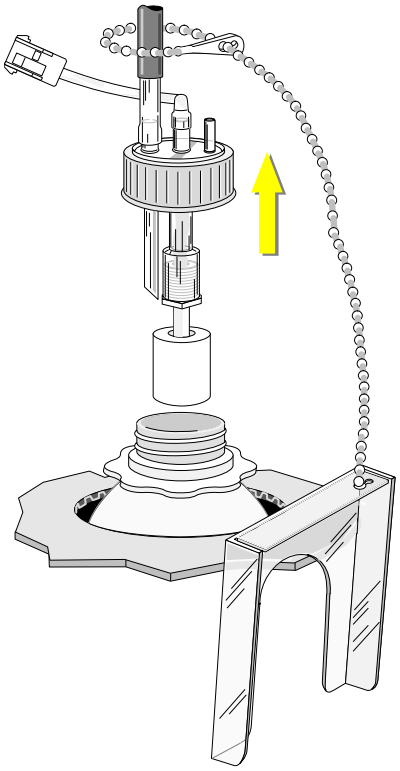
1. Put the instrument in STANDBY using the Standby/Reset switch.
2. Turn OFF the instrument using the On/Off switch on the back.
3. Disconnect the electrical connector by:
   - Pressing the two lock releases ❶ together, then
   - Pulling the connector ❷ apart.



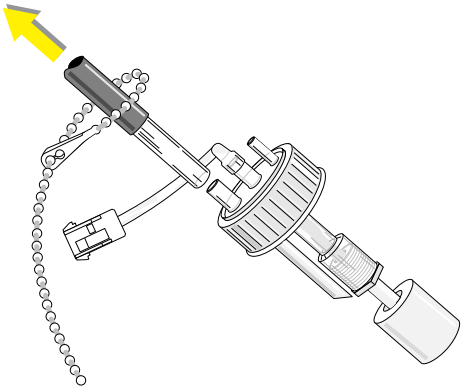
4. Unscrew the waste assembly cap and slide the collar off the waste container.



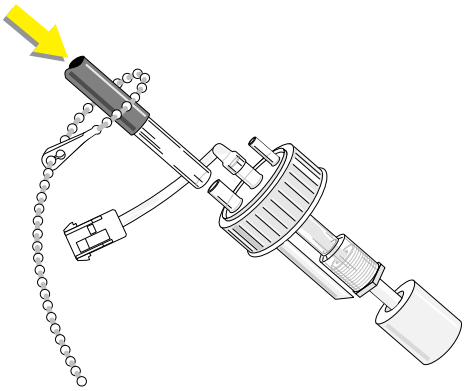
5. Carefully lift the assembly from the waste container. Wait while any residual waste liquid runs into the container.



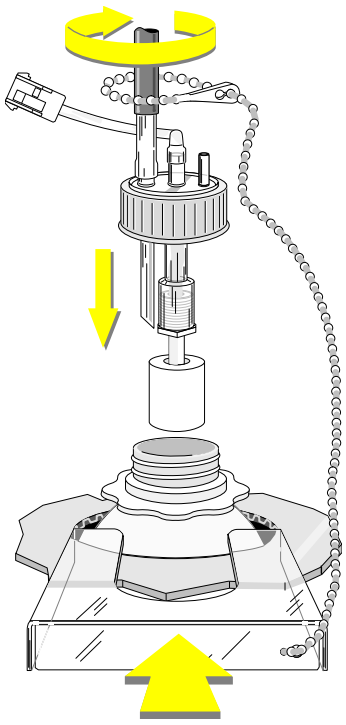
6. Remove the tubing from the old waste assembly.



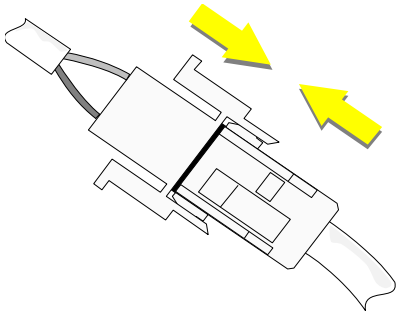
7. Attach the tubing to the new waste assembly.



8. Secure the new waste assembly to the waste container.
   a. Carefully put the waste assembly straight into the waste container and screw the cap in place.
   b. Slide on the collar.
   c. Tighten the cap.



9. Reconnect the electrical connector.
10. Return the On/Off switch to ON.
11. Return the Standby/Reset switch to the READY position.

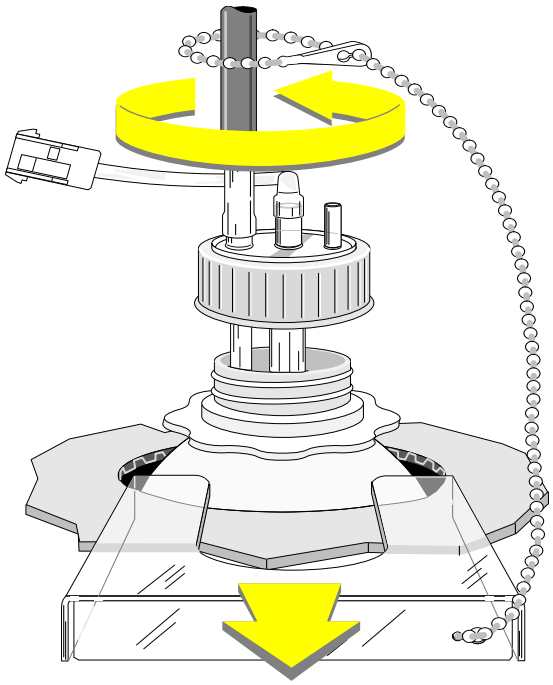


4.16 REPLACE WASTE CONTAINER

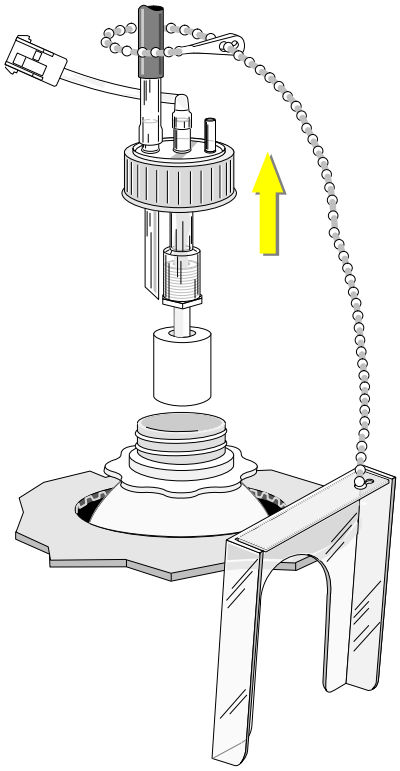
1. Put the instrument in STANDBY using the Standby/Reset switch.
2. Turn OFF the instrument using the On/Off switch on the back.

WARNING Biohazardous contamination could occur from contact with the old waste container and its associated tubing if not handled with care. Wear protective gear. Avoid skin contact. Clean up spills immediately. Dispose of the contents of the waste container according to your local regulations and acceptable laboratory procedures.

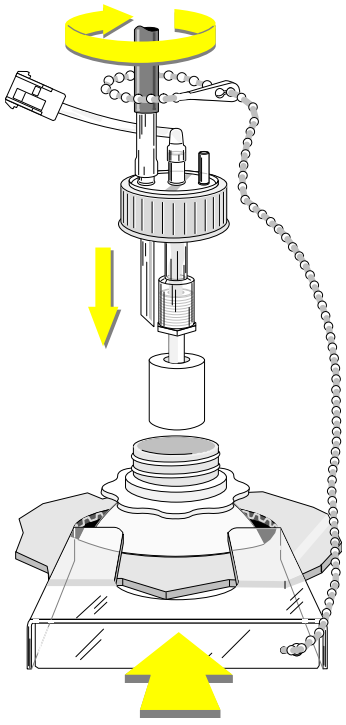
3. Unscrew the waste assembly cap and slide the collar off the full waste container.



4. Lift the waste assembly straight up and out.



5. Transfer the waste assembly to the empty waste container and secure it.
   a. Carefully put the waste assembly straight into the empty waste container and screw the cap in place.
   b. Slide on the collar.
   c. Tighten the cap.



6. Dispose of the biohazardous waste according to your laboratory's protocol.
7. Make sure you connected the waste assembly to the empty container correctly and that the connection is firm before every Startup.
8. Put the waste container in a place where the container and its tubing are safe from disturbance.
9. Return the On/Off switch to ON.
10. Return the Standby/Reset switch to the READY position.

CAUTION Incomplete drainage and overflow into the vacuum system can occur if the waste line is longer than the recommended length. If it is necessary to increase the length of the waste line supplied, call your Beckman Coulter Representative before you make any modifications.

5.1 OVERVIEW

Your best line of defense is to know what your HmX Hematology Analyzer does and how it sounds. Look through the pictures of Normal Sample Flow in Chapter 3 of the Reference manual. Then watch and listen while the instrument goes through its cycles.

If you later find your unit is not operating properly, you can begin to isolate the problem using two mutually reinforcing approaches:

1. If you find a series of unusual sample results, turn to the relevant Troubleshooting Table in this list.

Table	Types of Results
5.1	All parameters questionable
5.2	All counted parameters are consistently lower than normal
5.3	All counted parameters are consistently higher than normal
5.4	WBC **only** is higher than normal
5.5	WBC results are lower than normal
5.6	Hgb results questionable
5.7	RBC, Plt and MCV **only** are affected
5.8	WBC/RBC baths overflow

Start at the top of the table and work your way down until you solve the problem. If you get to the bottom of the table and the problem still exists, call your Beckman Coulter Representative.

WARNING Biohazardous material might be contained in the components that you are troubleshooting and could cause contamination unless handled with care. To avoid contamination from biohazardous materials, you should wear all your protective laboratory gear, including goggles or glasses, when you are troubleshooting and when you are operating the instrument normally.

2. If your unit does not sound right or gives other indications of a possible problem, you can watch how the instrument cycles a sample.
   a. Open the upper front door.
   b. Read down the list in the chart below and find, on the unit, where you will look for each action.
   c. Cycle a sample and watch each action. It may take several cycles to observe all the actions.
   d. If you find a problem, start your troubleshooting by turning to the listed reference.

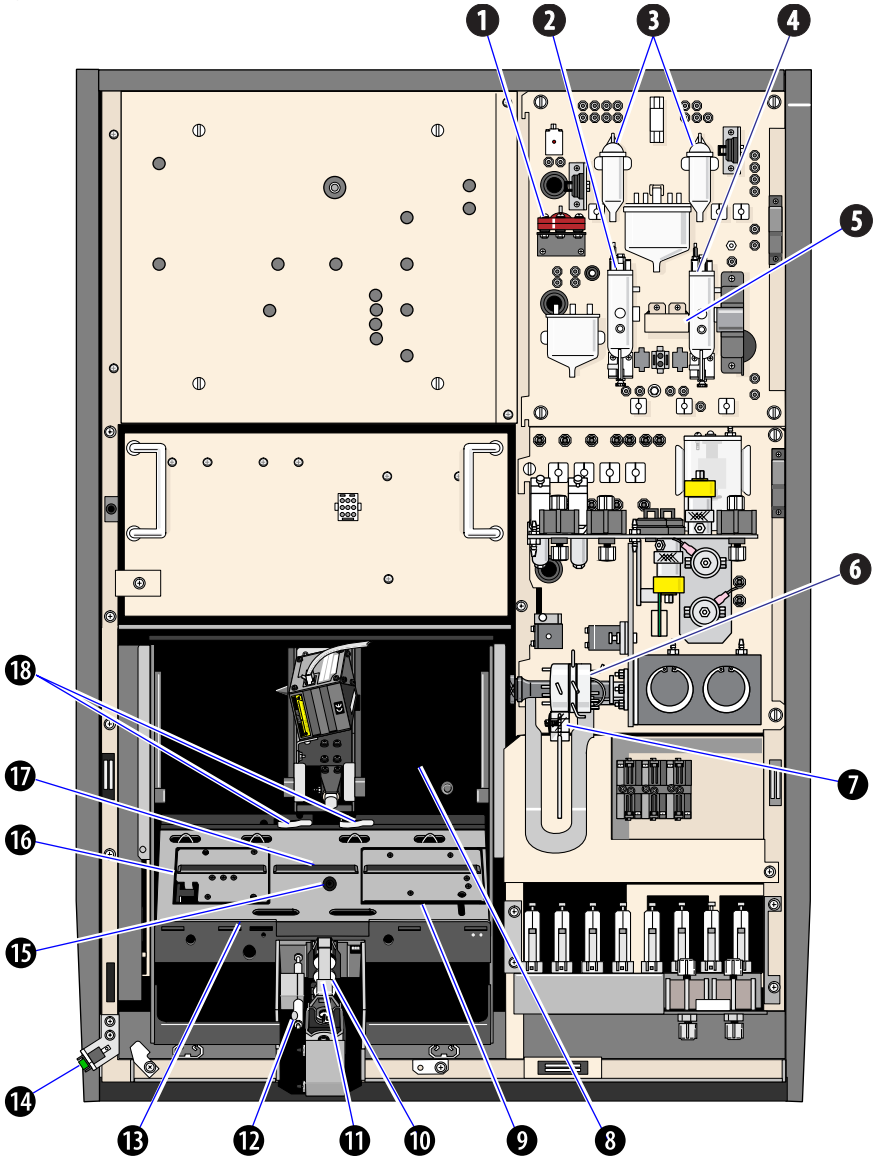
   Note: Information on how to troubleshoot the autoloader begins in Heading 5.3, TROUBLESHOOTING THE AUTOLOADER MECHANISM.

What action?	Where to look	Yes/No?	Refer to
Did the instrument aspirate?	BSV aspiration line		Table 5.1
Did the BSV rotate?	BSV center section		Heading 3.3, CLEAN OUTSIDE OF BLOOD SAMPLING VALVE (BSV) and Heading 3.4, CYCLE BSV.
Did baths fill with the dilution?	Level in baths should be above the apertures		Table 5.1
Did you see mixing bubbles?	7-10 large bubbles from bottom of baths in 5 bursts		Table 5.1
Did the instrument add lytic reagent?	Color change in the WBC bath		Table 5.4
Was the sample pulled through the aperture?	Drops coming into the vacuum isolator		Table 5.2
Did the baths drain completely?	Baths		Table 5.1
Did the baths rinse?	Diluent in baths with higher level in the WBC bath		Table 5.1
Are parameter results unusually high or low?	Yes/No? Which parameters?		Relevant table

Troubleshooting Figures

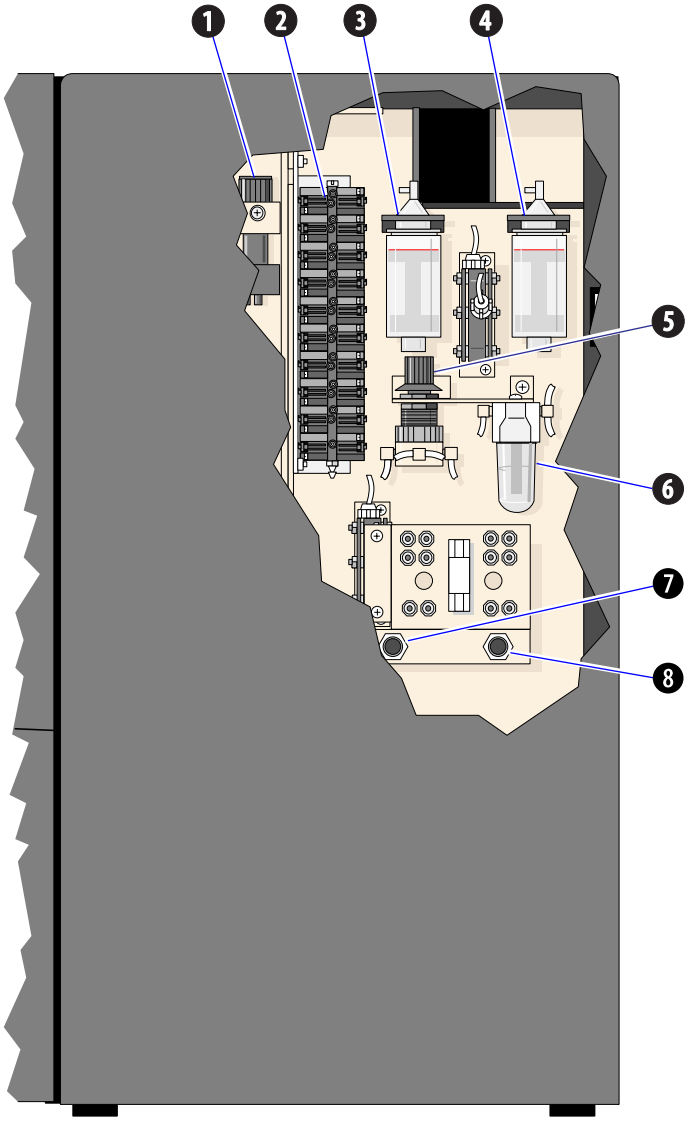
Use Figure 5.1, Figure 5.2, Figure 5.3, and Figure 5.4 to locate components listed in the troubleshooting tables.

Figure 5.1 Instrument with Front Covers Removed



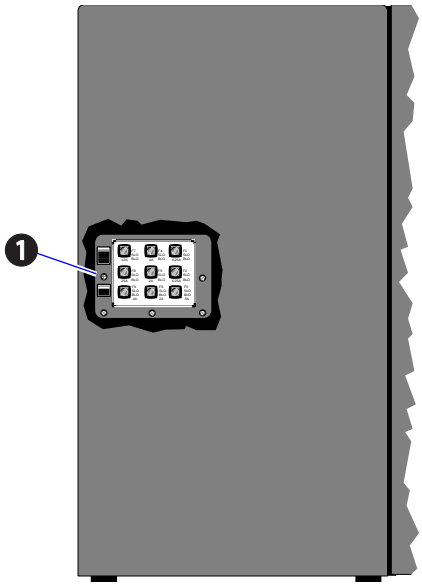
1	LYTIC REAGENT PUMPS	10	NEEDLE CARTRIDGE
2	RBC APERTURE BATH	11	NEEDLE FORWARD SENSOR (UNDER NEEDLE CARTRIDGE)
3	VACUUM ISOLATORS	12	TUBE PUSHER
4	WBC APERTURE BATH	13	ROCKER BED
5	HEMOGLOBIN LAMP	14	STANDBY/RESET SWITCH
6	SAMPLE VALVE (BSV)	15	TUBE AVAILABLE SENSOR
7	RINSE BLOCK	16	LEFT ELEVATOR
8	LOADING BAY	17	GUIDE RAIL
9	RIGHT ELEVATOR	18	BED SPRINGS

Figure 5.2 Right Side of Instrument



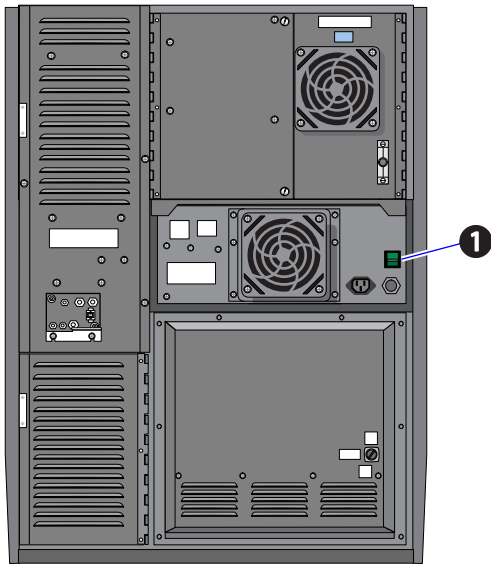
❶	VACUUM REGULATOR	❺	30 psi ADJUSTMENT KNOB
❷	SOLENOID PANEL	❻	VACUUM TRAP
❸	WBC DILUENT PUMP	❼	SHEATH PRESSURE ADJUSTMENT KNOB
❹	RBC DILUENT PUMP	❽	SAMPLE PRESSURE ADJUSTMENT KNOB

Figure 5.3 Left Side of Instrument



❶ FUSE PANEL

Figure 5.4 Back of Instrument



❶ POWER (ON/OFF) SWITCH

5.2 TROUBLESHOOTING CBC THROUGH UNUSUAL RESULTS

Table 5.1 All Parameters Questionable

Sample only partially aspirated?	• If you are in the Secondary mode, rerun the sample. Hold the vial against the front of the aspirate probe until you hear the beep. • If you are in the Primary mode: ▸ Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ BSV Tests ▸▸ Cycle BSV.** Press Enter and watch BSV action. Clean the outside of the BSV if rotation is hesitant. Follow the procedure in Heading 3.3, CLEAN OUTSIDE OF BLOOD SAMPLING VALVE (BSV). ▸ Check for kinks in the aspiration line. ▸ Cycle a blood and check for a single bubble between blood and diluent. ▸ Perform Clean Needle procedure. 1) Put one part high-quality, fragrance-free bleach (5% sodium hypochlorite) and one part distilled water in a cap-pierce tube. 2) Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Fluidic Tests ▸▸ Clean Needle.** 3) Press Enter. 4) Follow the screen instructions. • Check the pneumatic tubing that goes through the pinch valves associated with the Primary and Secondary mode aspiration pumps. Look for pinches, clogs or leaks. ▸ Remove clogs by connecting a closed syringe to the clogged tubing and pulling open the syringe to remove the clog. ▸ Replace any problem tubing with tubing of the same diameter, length and material. • Check the operation of the pinch valves associated with the Primary and Secondary mode aspiration pumps. Cycle a sample and watch for their movement. If they seem to be malfunctioning, call your Beckman Coulter Representative for assistance.
Sample sufficiently mixed?	1. Remix the sample. 2. Analyze the sample **twice** more. If the two results are equivalent but different from the problem results, redraw and rerun the sample.

Table 5.1 All Parameters Questionable *(Continued)*

No dilution gets to the baths? or Incomplete dilution gets to the baths? or Dilution enters the baths with many air bubbles? or Baths do not rinse completely at the end of the cycle?	• Cycle a sample and watch. • Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ BSV Tests ▸▸ Cycle BSV.** Press Enter and watch BSV action. Clean the outside of the BSV if rotation is hesitant. Follow the procedure in Heading 3.3, CLEAN OUTSIDE OF BLOOD SAMPLING VALVE (BSV). • If your diluent supply is low, replace the container as in Heading 4.12, REPLACE REAGENT CONTAINERS. • Prime the pumps: Select **Diluter Functions ▸▸ Prime Reagents ▸▸ Diluent.** Press Enter. • Verify that the rinse block is not screwed on too tightly. • Watch bath-filling action: Select **Sample Analysis ▸▸ Run Samples.** Press F8 **RINSE**. • Open the right side door to be sure there are no little bubbles in the conical tops of the RBC and WBC diluent dispense pumps. • Check Diluter tubing and fittings for leaks, clogs, pinches, and loose connections. ▸ Remove clogs by connecting a closed syringe to the clogged tubing and pulling open the syringe to remove the clog. ▸ Replace problem tubing with tubing of the same diameter, length and material. • Check the RBC and WBC diluent dispense pumps for leaks. • If pickup tubes are faulty, replace them as instructed under Heading 4.13, REPLACE REAGENT PICKUP TUBES.
Is there a mixing bubble problem?	Check mixing bubble action: 1. Open the upper front door. 2. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Fluidic Tests ▸▸ Bubble Mix**. 3. Press Enter. 4. Watch the baths. You should see five bursts of 7 to 10 large bubbles rising from the bottom of each bath. • Check that the yellow-striped mixing bubble tubing is free of pinches, clogs and leaks. This tubing comes through fittings FF16 for the RBC bath FF20 for the WBC bath Replace problem tubing with tubing of the same color-code, bore-size, length and material. • Make sure the check valves in the mixing bubble tubing are working correctly. Heading 4.7, REPLACE CHECK VALVES, explains how to check and replace any faulty check valve.

Table 5.1 All Parameters Questionable *(Continued)*

Is the low vacuum out of range?	• Check the lower right of the screen for an error message. • If low vacuum is out of range, adjust it as in Heading 4.4, ADJUST PRESSURE AND LOW VACUUM.
Was any bleach left in the aperture baths after you cleaned them?	• Go through a Startup: ▸ Select **Diluter Functions ▸▸ Start Up.** Press Enter. ▸ When it finishes, repeat Startup. • Follow normal Startup procedures.
Did the baths drain completely?	• Watch for baths to drain: ▸ Select **Sample Analysis ▸▸ Run Samples.** Press F8 **RINSE**. ▸ Watch the baths. • Press F8 again. Watch to see if the pinch valves below the baths are working. If not, call your Beckman Coulter Representative for assistance. • Check that the tubing the baths drain through is free of pinches, clogs and leaks. ▸ Remove clogs by connecting a closed syringe to the clogged tubing and pulling open the syringe to remove the clog. ▸ Replace problem tubing with tubing of the same diameter, length and material.

Table 5.2 All Counted Parameters Are Consistently Lower Than Normal

BSV dirty?	Follow procedures in Heading 3.3, CLEAN OUTSIDE OF BLOOD SAMPLING VALVE (BSV). **Note:** A small amount of crystallized cleaning agent on the outside of the BSV is normal. However, if you notice blood on the outside of the BSV, call your Beckman Coulter Representative for assistance in troubleshooting.
Is the low vacuum too low?	• Check the lower right of the screen for an error message. • If low vacuum is too low, adjust it as in Heading 4.4, ADJUST PRESSURE AND LOW VACUUM.

Table 5.3 All Counted Parameters Are Consistently Higher Than Normal

Low vacuum too high?	• Check the lower right of the screen for an error message. • If low vacuum is too high, adjust it as in Heading 4.4, ADJUST PRESSURE AND LOW VACUUM.
Background count high?	1. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ System Test.** 2. Press Enter. Press F3 **Run**. 3. Wait for the background count results at the end of the cycle. Be sure all doors and panels are closed. 4. If the background is too high, check if: • The diluent is cloudy, contaminated, or expired. • System cables are loose between components. • Any panels or doors are open. • Reagent lines are touching any electrical lines or equipment. • The wall socket is properly grounded. • Waste line is shielded from electrical lines. • There is interference from other electrical equipment close to the unit. • Bubbles are in the RBC or WBC bath. • External cables are properly shielded and away from all power lines. • Mixing bubbles are entering the baths correctly. Follow steps under **Is there a mixing bubble problem?** in Troubleshooting Table 5.1.

Table 5.4 WBC Only Is Higher Than Normal

Mixing bubbles the problem?	Follow steps under **Is there a mixing bubble problem?** in Troubleshooting Table 5.1.
Electronic problems?	Follow procedures in Troubleshooting Table 5.3 under **Background Count High?**
Low vacuum too high?	• Check the lower right of the screen for an error message. • If low vacuum is too high, adjust it as in Heading 4.4, ADJUST PRESSURE AND LOW VACUUM.
Lytic reagent running out, expired or past the open stability?	• Check lytic reagent level. • Check lytic reagent line. • Check expiration date. **Select Special Functions ▸▸ Set Up ▸▸ System Set Up ▸▸ Reagents.** • Check when reagent was opened. If it is beyond the open stability limit, replace it. • Check that the lytic reagent cap is not cracked or off. • Change lytic reagent, if necessary. Follow the procedure in Heading 4.12, REPLACE REAGENT CONTAINERS.
Does lytic reagent enter the bath without microbubbles?	Watch to see if a rush of microbubbles enters the bath with the lytic reagent. • Check movement of pinch valve 1 located above the lytic reagent pumps. • Check the tubing in pinch valve 1 located above the lytic reagent pumps.
BSV leaking diluent between the sections during a cycle?	• Check and adjust the BSV thumbscrew for tightness. • Clean the outside of the BSV. Follow the procedure in Heading 3.3, CLEAN OUTSIDE OF BLOOD SAMPLING VALVE (BSV).

Table 5.5 WBC Results Are Lower Than Normal

WBC bath draining?	• Watch for bath drain: ▸ Select **Sample Analysis ▸▸ Run Samples.** Press F8 **RINSE**. ▸ Look at the bath. • Press F8 again. Watch to see if pinch valve 6 below the WBC bath is working. If not,call your Beckman Coulter Representative for assistance. • Check that the tubing the WBC bath drains through is free of pinches, clogs and leaks. ▸ Remove clogs by connecting a closed syringe to the clogged tubing and pulling open the syringe to remove the clog. ▸ Replace problem tubing with tubing of the same diameter, length and material.
Mixing bubbles the problem?	Follow procedures under **Is there a mixing bubble problem?** in Troubleshooting Table 5.1.
Is the low vacuum too low?	• Check the lower right of the screen for an error message. • If low vacuum is too low, adjust it as in Heading 4.4, ADJUST PRESSURE AND LOW VACUUM.
Is there a pinch, clog, or leak in the tubing between the WBC bath and its vacuum isolator?	• Check the tubing between the top of the WBC bath and its vacuum isolator chamber, especially where the I-beam tubing goes through the pinch valve. ▸ Remove clogs by connecting a closed syringe to the clogged tubing and pulling open the syringe to remove the clog. ▸ Replace problem tubing with tubing of the same diameter, length and material. • If you think the pinch valve is malfunctioning, call your Beckman Coulter Representative for assistance.

Table 5.6 Hgb Results Questionable

Hgb lamp off?	• Check that the electrical wire from the lamp is plugged into the CBC module panel. • If necessary, replace the lamp as shown in Heading 4.9, REPLACE HEMOGLOBIN LAMP ASSEMBLY.
Hgb lamp voltage needs adjusting?	1. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ System Test.** 2. Press Enter. Press F3 **Run**. 3. If the Hgb lamp voltage (Hgb V) result is red: a. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ HGB Lamp Adjust.** b. Press Enter. Wait. • If the DMS displays *OK*, press Esc to continue. • If the DMS displays *COULD NOT ADJUST HGB LAMP*, repeat the adjustment. If the error message recurs, call your Beckman Coulter Representative.
Was the abnormally low Hgb caused by an incomplete aspiration in the Secondary mode?	Rerun the sample. Hold the vial against the front of the aspirate probe until you hear the beep.
Lytic reagent running out, expired, past the open stability period, or contaminated?	• Check lytic reagent level. • Check lytic reagent line. • Check expiration date. **Select Special Functions ▸▸ Set Up ▸▸ System Set Up ▸▸ Reagents.** • Check when reagent was opened. If it is beyond the open stability limit, replace it. • Check that the lytic reagent cap is not cracked or off. • Change lytic reagent, if necessary. Follow the procedure in Heading 4.12, REPLACE REAGENT CONTAINERS.
WBC bath smudged?	Wipe it off with a lint-free tissue.

Table 5.7 RBC, PLT and MCV Only Are Affected

RBC or Plt counts higher than normal?	• Check background count and associated factors. Follow procedures in Troubleshooting Table 5.3 under **Background count high?** • Check for mixing bubble problems. Follow procedures under **Is there a mixing bubble problem?** in Troubleshooting Table 5.1. • See if the BSV is leaking diluent between the sections during a cycle. ▸ Check and adjust the BSV thumbscrew for tightness. ▸ Clean the outside of the BSV. Follow the procedure in Heading 3.3, CLEAN OUTSIDE OF BLOOD SAMPLING VALVE (BSV).
RBC or Plt counts lower than normal?	• Watch for bath drain: ▸ Select **Sample Analysis ▸▸ Run Samples.** Press F8 **RINSE**. ▸ Look at the bath. • Press F8 again. Watch to see if pinch valve 5 below the RBC bath is working. If not, call your Beckman Coulter Representative for assistance. • Check that the tubing the RBC bath drains through is free of pinches, clogs and leaks. ▸ Remove clogs by connecting a closed syringe to the clogged tubing and pulling open the syringe to remove the clog. ▸ Replace problem tubing with tubing of the same diameter, length and material. • Check the lower right of the screen for a low vacuum error message. If the vacuum is too low, follow steps in Heading 4.4, ADJUST PRESSURE AND LOW VACUUM. • Check for mixing bubble problems. Follow procedures under **Is there a mixing bubble problem?** in TroubleshootingTable 5.1. • Check the tubing between the top of the RBC bath and its vacuum isolator chamber, especially where the I-beam tubing goes through the pinch valve. ▸ Remove clogs by connecting a closed syringe to the clogged tubing and pulling open the syringe to remove the clog. ▸ Replace problem tubing with tubing of the same diameter, length and material. ▸ If you thing the pinch valve is malfunctioning, call your Beckman Coulter Representative for assistance.

Table 5.7 RBC, PLT and MCV Only Are Affected *(Continued)*

Plt results erratic?	• Check background count. Follow procedures in Troubleshooting Table 5.3 under **Background count high?**. • Check the sweep-flow line to the RBC bath to see if it is empty. If it is: ▸ Check diluent level and replenish diluent if it is low. Follow procedure in Heading 4.12, REPLACE REAGENT CONTAINERS. ▸ Check the sweep-flow tubing for a leak at the RBC bath. • Check the diluent in the RBC bath. It should be above the level of the aperture. • Check to see if there is a thin steady stream of microbubbles flowing from the brown-striped tubing up the back of the aperture. If so: ▸ Replace the check valve on that brown-striped tubing. The procedure is in Heading 4.7, REPLACE CHECK VALVES.
MCV trending upward?	Bleach the apertures. Follow the Bleach Apertures and Flow Cell procedure under Heading 3.2, BLEACH APERTURES AND FLOW CELL/DISINFECT.

Table 5.8 WBC/RBC Baths Overflow

WBC/RBC baths overflow	Check the WBC/RBC baths. Select **Sample Analysis ▸▸ Run Samples.** Press F8 **RINSE**. • Watch to see if the pinch valves below the baths are working. If not, call your Beckman Coulter Representative for assistance. • Check that the tubing the baths drain through is free of pinches, clogs and leaks. ▸ Remove clogs by connecting a closed syringe to the clogged tubing and pulling open the syringe to remove the clog. ▸ Replace problem tubing with tubing of the same diameter, length and material.

5.3 TROUBLESHOOTING THE AUTOLOADER MECHANISM

Table 5.9 Failure To Load or Unload Cassettes Properly

The right elevator could not pick up the cassette or did not return to its home position?	• Remove any cassettes from the load stack. • Check if the spring gates on both sides of the load stack are working properly by pushing the springs to the sides and releasing. • Check to see if the rollers on the gates are moving smoothly. • Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Autoloader Tests ▸▸ Right Elevator Up/Down.** The gates should open as the elevator rises to the top. • Call your Beckman Coulter Representative if the right elevator or the gates and rollers are still not working properly.
The left elevator could not deliver the cassette or did not return to its home position?	• Remove any cassettes from the unload stack. • Check if the spring gates on both sides of the unload stack are working properly by pushing the springs to the sides and releasing. • Check to see if the rollers on the gates are moving smoothly. • Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Autoloader Tests ▸▸ Left Elevator Up/Down.** The gates should not open as the elevator rises to the top. • Call your Beckman Coulter Representative if the left elevator or the gates and rollers are still not working properly.

Table 5.10 Failure To Rock Bed Properly

The Autoloader bed will not rock?	• Select **Sample Analysis ▸▸ Run Samples.** Press F9 **STOP**. When *SELECT FUNCTION* appears on the status line, Press F2 **START PRIMARY**. • Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Autoloader Tests ▸▸ Rock the Bed.** • Inspect the Autoloader Bed ▸ Turn OFF the instrument. ▸ Open the upper and lower front doors. ▸ Look to see if any object is preventing the bed from rocking. ▸ Close the lower then upper front doors. ▸ Turn ON the instrument. • Call your Beckman Coulter Representative if the bed is not working properly.

Table 5.11 Failure To Move Cassettes Properly

No cassette on the bed but *CANNOT MOVE CASSETTE ON BED* error displayed?	• Place a cassette on the loading gate. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Autoloader Tests ▸▸ Autoloader Test Routine.** • If the problem still exists, perform the Check Autoloader Bed Sensor procedure under Heading 5.4, AUTOLOADER CHECK PROCEDURES.
One or two cassettes on the bed that are not cleared?	• Perform the Jammed Cassette Removal procedure under Heading 4.3, JAMMED CASSETTE REMOVAL.

Table 5.12 Failure of Cassette To Clasp Tubes

Cassette does not firmly clasp tubes.	• Inspect cassette for crystal or blood buildup. • Wash cassette with soap or 10% bleach solution (1 part 5% sodium hypochlorite with 9 parts distilled water). • Rinse thoroughly with warm tap water. • Examine to be sure all crystals and blood buildup are eliminated.

Table 5.13 Autoloader Needle Pierce and Retract Failures

Incomplete needle pierce?	• Select **Sample Analysis ▸▸ Run Samples.** Press F9 **STOP**. When *SELECT FUNCTION* appears on the status line, Press F2 **START PRIMARY**. • If the error recurs, select Ctrl+C to clear the bed. • Try to process another cassette of samples. • Call your Beckman Coulter Representative if the problem still exists.
Incomplete needle retract?	• Select **Sample Analysis ▸▸ Run Samples.** Press F9 **STOP**. When *SELECT FUNCTION* appears on the status line, Press F2 **START PRIMARY**. • If the error recurs, select Ctrl+C to clear the bed. • Look and see if the needle assembly is in the home position. 1) Turn OFF the instrument. 2) Open the upper and lower front doors. 3) Look at the needle assembly. Make sure it is in the home position 4) Close the lower then upper front doors. 5) Turn ON the instrument. • Try to process another cassette of samples. • Call your Beckman Coulter Representative if the problem still exists

Table 5.14 Tube Retract Failure

Incomplete tube retract?	• Select **Sample Analysis ▸▸ Run Samples.** Press F9 **STOP**. When *SELECT FUNCTION* appears on the status line, Press F2 **START PRIMARY**. • If the error recurs, select Ctrl+C to clear the bed. • Look at the tube in the cassette. 1) Turn OFF the instrument. 2) Open the upper and lower front doors. If the tube pusher is still together with the tube inside the cassette, call your Beckman Coulter Representative. 3) Slide the cassette to the left and lift off the bed. Check to see if • The tube is the correct size for the cassette. • The springs inside the cassette are damaged. • The label on the tube is stopping the tube from being pushed back into the cassette. 4) Close the lower then upper front door. 5) Turn ON the instrument. • Try to process another cassette of samples. • Call your Beckman Coulter Representative if the problem still exists

Table 5.15 Tube Available Sensor Failure

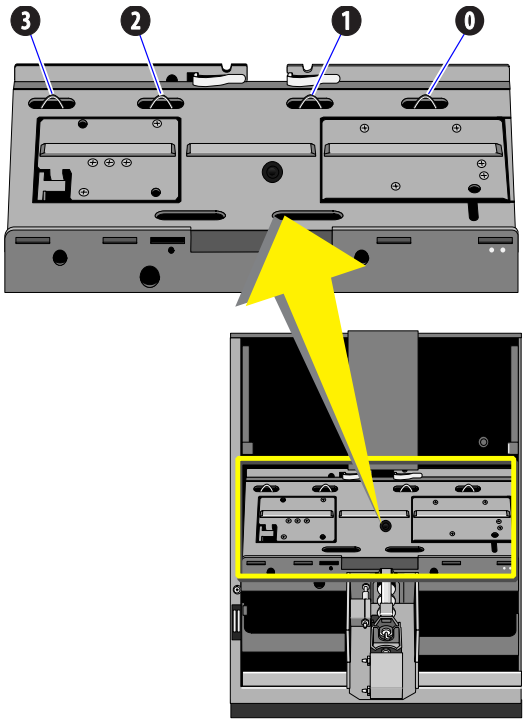
Tube available sensor error?	• Select **Sample Analysis ▸▸ Run Samples.** Press F9 **STOP**. When *SELECT FUNCTION* appears on the status line, Press F2 **START PRIMARY**. • Select Ctrl+C. • Check the Tube Available sensor. Press the cone-shaped tube available sensor in the middle of the bed. If the sensor is jammed, call your Beckman Coulter Representative.

5.4 AUTOLOADER CHECK PROCEDURES

Check Autoloader Bed Sensors

1. Open the upper and then the lower front doors.

2. Rotate the rocker bed forward to the pierce position. Locate the four sensors (❼, ❶, ❷, ❸) on the back of the bed.
3. If any sensor is partially or entirely under the surface of the bed, gently press on it to return the sensor above the surface of the bed. If unsuccessful, call your Beckman Coulter Representative.



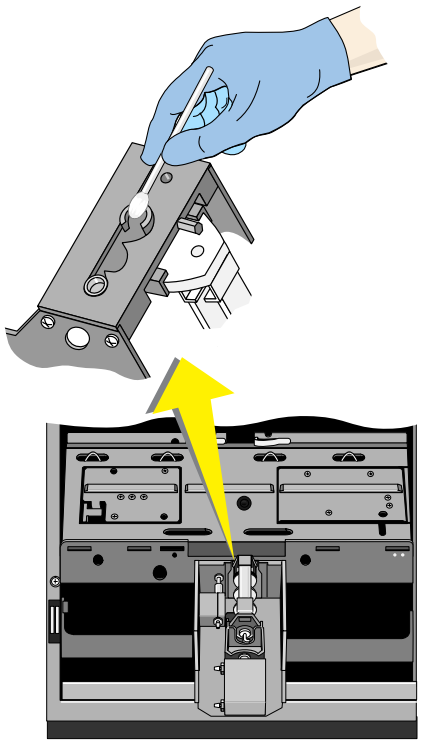
4. If the sensors return to the surface of the bed, close the lower and upper front doors.

5. Place a cassette in the loading bay.
6. Select **Special Functions ▸▸ Diagnostics ▸▸ Operator Options ▸▸ Autoloader Tests ▸▸ Autoloader Test Routine.**
7. Resume operation if no problems were reported on the screen.
8. If an error message displays, call your Beckman Coulter Representative.

Check Tube Forward Sensor

1. If there is a cassette on the bed, perform the Jammed Cassette Removal procedure under Heading 4.3, JAMMED CASSETTE REMOVAL.
2. Open the upper and then the lower front doors.

3. Place a swab against the tube forward sensor switch on the front of the needle assembly. The sensor should move when you press on it.
4. If the sensor does not move when you press on it, call your Beckman Coulter Representative.
5. If the sensor is operating properly, check the guide rail and the two springs in the back of the bed for damage. If these are damaged, call your Beckman Coulter Representative.



6. Close the lower and upper front doors.

7. Resume operation.
8. If the problem recurs, call your Beckman Coulter Representative.

5.5 TROUBLESHOOTING DIFF THROUGH SCATTERPLOTS AND HISTOGRAMS

Use the following checklists to give you suggestions on how to proceed if you find consistently unusual diff results.

1. Look at the Data Review chapter in the Operator's Guide for models of how normal scatterplots and histograms appear.
2. You can start to troubleshoot unusual diff results in two ways. Either:
   - Start at the beginning of the Diff Step-by-Step Troubleshooting Guide which appears on the next page. Answer each question in turn.

     OR
   - Refer to the Checklist below which lists items to examine for each symptom.
3. Call your Beckman Coulter Representative if you need additional help.

Checklist	Symptoms
1	DF1 scatterplot is abnormal.
1A	DF1 scatterplot shows too many cells in the bottommost area
1B	DF1 scatterplot shows poor separation between lymphocyte and neutrophil populations
1C	DF1 scatterplot has too many cells lined up across the top line of the scatterplot
1D	DF1 scatterplot is nearly blank
1E	DF1 scatterplot shifted to the left or right
1F	DF1 scatterplot shifted toward the bottom or top
2	DF2 or DF3 scatterplot is abnormal
3	VCS histograms appear abnormal
3A	Abnormal Volume histogram
3B	Abnormal Conductivity histogram
3C	Abnormal Scatter histogram
4	Abnormal LATRON™ reagent VCS histograms
4A	Abnormal LATRON reagent Volume histogram
4B	Abnormal LATRON reagent Conductivity histogram
4C	Abnormal LATRON reagent Scatter histogram

DIFF STEP-BY-STEP TROUBLESHOOTING GUIDE

Does the DF1 scatterplot appear normal? (Compare it to the DF1 example in the Operator's Guide Data Review chapter.)

YES — Go to Checklist 1.

NO

Does the DF2 scatterplot appear normal? (Compare it to the DF2 example in the Operator's Guide Data Review chapter.)

YES — Go to Checklist 2.

NO

Does the DF3 scatterplot appear normal? (Compare it to the DF3 example in the Operator's Guide Data Review chapter.)

YES — Go to Checklist 2.

NO

Do the VCS histograms appear normal? (Compare them to the VCS Histograms example in the Operator's Guide Data Review chapter.)

YES — Go to Checklist 3.

NO

Do the LATRON reagent histograms appear normal? (Compare them to the F5-Histo screen on the Control Review or Report screen)

YES — Go to Checklist 4.

NO

Are the LATRON reagent results within limits? (Look at the Operator's Guide Startup and Controls chapter.)

YES — Go to the Startup and Controls chapter in the Operator's Guide for the LATRON reagent troubleshooting chart.

NO

Call your Beckman Coulter Representative if you need additional help.

CHECKLIST 1:DF1 SCATTERPLOT IS ABNORMAL

Does the DF1 scatterplot have too many cells in bottommost area?

NO | YES

| |

| |

| Go to Checklist 1A.

|

Does the DF1 scatterplot show poor separation between the lymphocyte and neutrophil populations?

NO | YES

| |

| |

| Go to Checklist 1B.

|

Does the DF1 scatterplot have lots of cells lining the top of the scatterplot?

NO | YES

| |

| |

| Go to Checklist 1C.

|

Is the DF1 scatterplot blank or nearly blank?

NO | YES

| |

| |

| Go to Checklist 1D.

|

Does the DF1 scatterplot appear to be shifted to the left or right?

NO | YES

| |

| |

| Go to Checklist 1E.

|

Does the DF1 scatterplot appear to be shifted toward the bottom or top?

NO | YES

| |

| |

| Go to Checklist 1F.

|

Call your Beckman Coulter Representative if you need additional help.

CHECKLIST 1A: TOO MANY CELLS IN THE BOTTOMMOST AREA OF THE DF1 SCATTERPLOT

- Check for a sample problem
  - Sample handling
  - Abnormal blood chemistry
    - Abnormal triglyceride level
  - Abnormal RBC morphology
    - NRBCs
    - Platelet clumps
    - Sickle cells
- Check for a reagent problem
  - Reagents primed
  - Reagents expired
  - Past open box stability
  - Pooled reagents
  - Contaminated reagents
  - Reagent delivery
    - Reagent pumps
    - Reagent delivery path
- Check for a temperature problem
  - Temperature of the laboratory
  - Temperature of the reagents
    - Storage temperature
    - Transport temperature
    - Frozen and thawed but no mixing
    - Overheated for a long period - replace
- Check for an improper dilution of the blood
  - Not enough blood
  - Contaminated reagents

CHECKLIST 1B: DF1 SCATTERPLOT SHOWS POOR SEPARATION BETWEEN LYMPHOCYTE AND NEUTROPHIL POPULATIONS

- Check for a sample problem
  - Sample handling
    - Mishandled blood - temperature stress
    - Old blood
  - Abnormal blood morphology
  - Abnormal blood chemistry
- Check LATRON reagent results for a scatter problem
  - Abnormal scatter histogram and high CV%

CHECKLIST 1C: DF1 SCATTERPLOT HAS TOO MANY CELLS LINED UP ACROSS THE TOP LINE OF THE SCATTERPLOT

Check for a sample problem.
- Sample handling
- Abnormal blood morphology
- Abnormal blood chemistry

Check for a reagent problem, mainly StabiLyse™ reagent.
- Reagents primed
- Reagents expired
- Reagent delivery
  - Reagent pumps
  - Reagent delivery path

Check for a temperature problem.
- Temperature of the laboratory
- Temperature of the reagents

CHECKLIST 1D: DF1 SCATTERPLOT IS NEARLY BLANK

Check the Checklist 1C items.
Check that all cables on the TTM are firmly plugged in.
Select F7 **PURGE** on any **F3 Run** mode screen.
Adjust sheath pressure if necessary.
Check for leaks.
- Mixing chamber
- Sheath tank
- Disconnected tubing above Erythrolyse™ II reagent pumps
- Related tubing
- Sample line connections

CHECKLIST 1E: DF1 SCATTERPLOT SHIFTED TO THE LEFT OR RIGHT

Check for a sample problem.
- Sample handling
- Abnormal blood
- Abnormal blood chemistry

Check LATRON reagent results for a scatter problem.
- Abnormal scatter histogram and high CV%

CHECKLIST 1F: DF1 SCATTERPLOT SHIFTED TOWARD THE BOTTOM OR TOP

Check for a sample problem.
- Very old blood
- Sample handling
- Abnormal blood
- Abnormal blood chemistry

Check for a volume problem.
- Check LATRON reagent for a volume problem
  - Abnormal volume histogram and high CV%
  - Sample line connection
  - **Select** F7 **PURGE** on any **F3 Run** mode screen.

CHECKLIST 2: DF2 OR DF3 SCATTERPLOT IS ABNORMAL

- If the Lymphocyte/Monocyte and Granulocyte populations are not clearly separated in the DF2 display OR
- If the DF3 display has an abnormally large population of Basophils:

Check for a sample problem.
- Sample handling
- Abnormal blood
- Abnormal blood chemistry

Check LATRON reagent for a conductivity problem.
- Abnormal conductivity histogram and high CV%

CHECKLIST 3: VCS HISTOGRAMS APPEAR ABNORMAL

Does the Volume histogram appear normal?
YES NO
| |
| |
| Go to Checklist 3A.
|
Does the Conductivity histogram appear normal?
YES NO
| |
| |
| Go to Checklist 3B.
|
Does the Scatter histogram appear normal?
YES NO
| |
| |
| Go to Checklist 3C.
|
Call your Beckman Coulter Representative if you need additional help.

CHECKLIST 3A: ABNORMAL VOLUME HISTOGRAM

Check for a sample problem.
- Sample handling
- Abnormal blood morphology
- Abnormal blood chemistry

Check for a volume problem.
- Abnormal Volume histogram and high CV%
- **Select** F7 **PURGE** on any **F3 Run** mode screen.
- Sample line connections

CHECKLIST 3B: ABNORMAL CONDUCTIVITY HISTOGRAM

Check for a sample problem.
- Sample handling
- Abnormal blood morphology
- Abnormal blood chemistry

Check for an RF problem.
- Abnormal Conductivity histogram and high CV%
- **Select** F7 **PURGE** on any **F3 Run** mode screen.

CHECKLIST 3C: ABNORMAL SCATTER HISTOGRAM

Check for a sample problem.

- Sample handling
- Abnormal blood morphology
- Abnormal blood chemistry

Check LATRON reagent results for a scatter problem.

- Abnormal Scatter histogram and high CV%

CHECKLIST 4: ABNORMAL LATRON™ REAGENT VCS HISTOGRAMS

Does the LATRON reagent Volume histogram appear normal?

YES NO
| |
| |
| Go to Checklist 4A.
|

Does the LATRON reagent Conductivity histogram appear normal?

YES NO
| |
| |
| Go to Checklist 4B.
|

Does the LATRON reagent Scatter histogram appear normal?

YES NO
| |
| |
| Go to Checklist 4C.
|

Call your Beckman Coulter Representative if you need additional help.

CHECKLIST 4A: ABNORMAL LATRON REAGENT VOLUME HISTOGRAM

Check for a LATRON reagent problem.
- LATRON reagent handling

Check for a Volume problem.
- Abnormal Volume histogram and high CV%
- **Select** F7 **PURGE** on any **F3 Run** mode screen.
- Sample line connection

CHECKLIST 4B: ABNORMAL LATRON REAGENT CONDUCTIVITY HISTOGRAM

Check for a LATRON reagent problem.
- LATRON reagent handling

Check for an RF problem.
- Abnormal Conductivity histogram and high CV%
- **Select** F7 **PURGE** on any **F3 Run** mode screen.

CHECKLIST 4C: ABNORMAL LATRON REAGENT SCATTER HISTOGRAM

Check for a LATRON reagent problem.
- LATRON reagent handling

Check LATRON reagent results for a scatter problem.
- Abnormal Scatter histogram and high CV%
- **Select** F7 **PURGE** on any **F3 Run** mode screen.

5.6 ERROR MESSAGES

Tables 5.16 through 5.26 list the error messages displayed on the DMS for the Analyzer, the Sample Handler, and the DMS, in alphabetic order. These tables also list the action message displayed, when applicable, and the probable causes and corrective actions for the error. If the corrective action does not resolve the problem, call your Beckman Coulter Representative.

The error messages are listed in the instrument's Error File. Press Ctrl+F2 to access the Error File. It contains up to 100 error messages. When the Error File contains more than 100 messages, it overwrites the oldest message as a new message is posted. Use as needed for troubleshooting. Print periodically for your logbook.

All the error messages are referenced in the index.

Table 5.16 System Error Messages - Symbols and Numbers

Error Message	Probable Cause	Action Message	Corrective Action
3 CONSECUTIVE FLOWCELL CLOGS	Three consecutive flow cell clogs (any combination of *FC*, *PC1*, and *PC2*) occurred.	*PURGE THE FLOWCELL*	1. Clear the flow-cell clog. See Heading 3.6, CLEAR FLOW CELL CLOG. 2. To resume operation, access the appropriate screen, reselect the mode of operation, and rerun the samples.
3 CONSECUTIVE NO MATCHES	Processed sample's primary identifier did not match any entry in preassigned worklist for 3 consecutive cycles.	*CLEAR ERROR/CHECK WLST/RESTART*	1. Delete one or more samples associated with error from worklist. 2. Restart the system.
3 CONSECUTIVE NO READS	Bar-code reader unable to read barcode on tube three consecutive times.	*CLEAR ERRORS/CHECK LABELS/RESTART*	1. Check labels for proper positioning. 2. Delete one or more samples associated with error from worklist. 3. Restart the system.
3 CONSECUTIVE PARTIAL ASPIRATIONS	Three consecutive attempts to aspirate were unsuccessful.	*CHECK/CLEAN THE NEEDLE*	1. Check the needle for clogs and clean if necessary. See the cleaning the needle portion of Heading 4.10, REPLACE NEEDLE ASSEMBLY. 2. If the needle is not clogged, see the Troubleshooting section in Table 5.1 for additional corrective actions. 3. Delete one or more samples associated with error from worklist. 4. To resume operation, access the appropriate screen, reselect the mode of operation, and rerun the samples.

Table 5.16 System Error Messages - Symbols and Numbers *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
3 CONSECUTIVE VOTEOUTS	Three consecutive total voteouts of a particular parameter occurred.	*CHECK/CLEAN THE APERTURES*	1. Zap the apertures. See Heading 3.1, ZAP APERTURES. 2. If error recurs, check the mixing bubbles. See Table 5.1 for corrective actions. 3. If error recurs, bleach the apertures. See Heading 3.2, BLEACH APERTURES AND FLOW CELL/DISINFECT. 4. Delete one or more samples associated with error from worklist. 5. To resume operation, access the appropriate screen, reselect the mode of operation, and rerun the samples.
+5 Vdc OUT OF RANGE [XX.XX] **Note**: XX.XX = actual reading.	+5 Vdc instrument voltage out of operating range. Range is +4.75 to +5.25 Vdc.	*PERFORM SYSTEM TEST*	1. Perform System Test. See Heading 4.2, SYSTEM TEST. 2. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.
+6.3 Vdc OUT OF RANGE [XX.XX] **Note**: XX.XX = actual reading.	+6.3 Vdc instrument voltage out of operating range. Range is +5.98 to +6.62 Vdc.	*PERFORM SYSTEM TEST*	1. Perform System Test. See Heading 4.2, SYSTEM TEST. 2. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.
10 NO READ, NO MATCH, PART.ASP	Ten attempts to read, match, and/or aspirate sample were unsuccessful and posted on worklist.	*CLR ERRORS/CHK LBL,WLST, ASP/RESTART*	1. Delete one or more samples with *NO READ*, *NO MATCH* or *PART ASP* messages from worklist. 2. Check labels for proper positioning and needle for clogs. 3. Clean needle if necessary. See the cleaning the needle portion of Heading 4.10, REPLACE NEEDLE ASSEMBLY. 4. Restart the system.
+12 Vdc OUT OF RANGE [XX.XX] **Note:** XX.XX = actual reading.	+12 Vdc instrument voltage out of operating range. Range is +11.40 to +12.60 Vdc.	*PERFORM SYSTEM TEST*	1. Perform System Test. See Heading 4.2, SYSTEM TEST. 2. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.
-15 Vdc OUT OF RANGE [XX.XX] **Note:** XX.XX = actual reading.	-15 Vdc instrument voltage out of operating range. Range is -15.75 to -14.25 Vdc.	*PERFORM SYSTEM TEST*	1. Perform System Test. See Heading 4.2, SYSTEM TEST. 2. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.

Table 5.16 System Error Messages - Symbols and Numbers *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
+15 Vdc OUT OF RANGE [XX.XX] **Note:** XX.XX = actual reading.	+15 Vdc instrument voltage out of operating range. Range is +14.25 to +15.75 Vdc.	*PERFORM SYSTEM TEST*	1. Perform System Test. See Heading 4.2, SYSTEM TEST. 2. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.
+24 Vdc OUT OF RANGE [XX.XX] **Note:** XX.XX = actual reading.	+24 Vdc instrument voltage out of operating range. Range is +22.80 to +25.20 Vdc.	*PERFORM SYSTEM TEST*	1. Perform System Test. See Heading 4.2, SYSTEM TEST. 2. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.
30 PSI OUT OF RANGE [XX.XX] **Note:** XX.XX = actual reading.	Pressure out of established operating range.	*CHECK/ADJUST 30 PSI*	1. Perform System Test to check the pressure. See Heading 4.2, SYSTEM TEST. 2. Adjust the 30 psi pressure. See Heading 4.4, ADJUST PRESSURE AND LOW VACUUM.
+240 Vdc OUT OF RANGE [XX.XX] **Note:** XX.XX = actual reading.	+240 Vdc instrument voltage out of operating range. Range is +228.0 to +265.0 Vdc.	*PERFORM SYSTEM TEST*	1. Perform System Test. See Heading 4.2, SYSTEM TEST. 2. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.
+300 Vdc OUT OF RANGE [XX.XX] **Note:** XX.XX = actual reading.	+300 Vdc instrument voltage out of operating range. Range is +285 to +315 Vdc.	*PERFORM SYSTEM TEST*	1. Perform System Test. See Heading 4.2, SYSTEM TEST. 2. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.
+1350 Vdc OUT OF RANGE [XX.XX] **Note:** XX.XX = actual reading.	+1350 Vdc instrument voltage out of operating range. Range is +1186 to +1523 Vdc.	*PERFORM SYSTEM TEST*	1. Open the right side door. Check if the red LED is lit on the TTM laser cover. If it is not, press down on the cover. If this does not correct the problem, go to step 2. 2. Perform System Test. See Heading 4.2, SYSTEM TEST. 3. Replace fuse if necessary. See Heading 4.8, REPLACE FUSES.

Table 5.17 System Error Messages - A and B

Error Message	Probable Cause	Action Message	Corrective Action
A/D FAILURE	Analog-to-digital converter failed to generate an interrupt within specified time.	*RE-ENTER FUNCTION/ RECYCLE SPECIMEN*	1. Attempt to perform requested function again, and rerun the specimen. 2. If error recurs, reset the system.
A/D MEASUREMENT ERROR	Analog-to-digital converter encountered too much noise on ground reference.	*RE-ENTER FUNCTION/ RECYCLE SPECIMEN*	1. Attempt to perform requested function again, and rerun the specimen. 2. If error recurs, reset the system.
ANALYSIS NOT DONE	Instrument error detected by CPU while sample analysis in progress. System locked up.	*RESET THE SYSTEM*	Reset the system.
ANALYZER POWER INTERRUPTION	Instrument detected Analyzer power failure.	*DMS WILL RESET*	1. Any process running in DMS terminates, and the DMS resets. The system resynchronizes and returns to *Ready* state. 2. To resume operation, reselect the desired function.
AUTOLOADER PAUSED	Autoloader module reached maximum allowable rocking time for cassettes on rocker bed. Autoloader module paused to prevent damage to samples in cassettes. System now in Secondary mode.	*SELECT STOP THEN START PRIMARY*	Restart the Primary mode: 1. From the Sample Analysis Run window, press F9 **Stop.** 2. Press F2 **Start Primary** to resume Autoloader module operation.
BACKWASH NOT PERFORMED	Rinse block not in proper position for backwash.	*PERFORM RINSE*	From the Sample Analysis Run window, press F8 **Rinse**.
BAD DOWNLOAD MSG RCVD - 196 CODE	DMS received bad download message while downloading 196 code. System locked up.	*RESET THE SYSTEM*	Reset the system.
BAD PORT IN USE TO SEND DATA	Data sent to wrong port. System locked up.	*RESET THE SYSTEM*	Reset the system.
BARCODE NOT READ	Barcode reader unable to read barcode on tube label.	*CHECK LABEL QUALITY*	Verify the bar-code label is properly positioned on the tube and has correct specifications.
BARCODE READER DID NOT RESPOND	Bar-code scanner not active. Cass/pos and tube labels not read. System locked up.	*RESET THE SYSTEM*	Reset the system.
BLOOD COMPARISON OUT OF LIMITS	Instrument unable to detect presence of blood.	*REMIX AND REPEAT THE SAMPLE*	1. Remix the blood specimen and rerun it. 2. If error recurs, run in the Secondary mode.

Table 5.18 System Error Messages - C

Error Message	Probable Cause	Action Message	Corrective Action
CAL FACTORS NOT WITHIN LIMITS	At least one calibration factor requested for transmission is not within specified limits.	*REPEAT CBC CALIBRATION*	Check the limits and recalibrate the instrument.
CANNOT BATCH. SYSTEM IN RUN MODE	Attempt made to batch transmit or print while system was processing a sample in Run mode.	*PRESS F9-STOP. RETRY BATCH XMIT/PRN*	1. Wait until the sample is completed. 2. From the Run window, press F9 **Stop** (to set DMS mode to no activity) and request batch processing again.
CANNOT CYCLE WHILE BATCH PROCESSING	Attempt made to run a sample while batch processing in progress.	*WAIT/STOP PROCESSING TO START CYCLE*	Wait until batch processing is completed, then attempt to run sample or cancel batch (**Special Functions ▸▸ Set Up ▸▸ Sample Analysis ▸▸ Set Up ▸▸ Delete Host Spooler or Clear Printer Spooler Queue**) process.
CANNOT LIFT CASSETTE	Cassette cannot be lifted; indexing mechanism jammed or lift motor faulty.	*CHECK FOR A JAMMED MECHANISM*	Verify performance of the indexing mechanism. See Table 5.9 and Table 5.11.
CANNOT LOWER CASSETTE	Cassette cannot be lowered; indexing mechanism jammed or lower motor faulty.	*CHECK FOR A JAMMED MECHANISM*	Verify performance of the indexing mechanism. See Table 5.9 and Table 5.11.
CANNOT MOVE CASSETTE ON BED	Cassette does not move along the bed; cassette jammed, indexing mechanism failed, or cassette motor faulty.	CHECK FOR A JAMMED MECHANISM	1. Put the instrument in Standby. 2. Remove the jammed cassette. 3. Verify performance of indexing mechanism. See Table 5.11.
CANNOT OPEN RAW.DAT FILE	System unable to open RAW.DAT file. Space on hard disk may be insufficient.	*DISK MAY BE FULL*	Call your Beckman Coulter Representative.
CANNOT PRINT TICKET WHILE CYCLING	F2 **Ticket** pressed from Sample Analysis screen while TICKET PRINTER CONNECTED and AUTO-TICKET PRINT set to Y and instrument in Run mode.	*DISABLE AUTO-TICKET OR PRESS F3,F9*	1. Set AUTO-TICKET PRINT to N, or press F3 **Run** and then F9 **Stop**. 2. Press F9 **Ticket**.
CANNOT ROCK BED	Bed does not rock; indexing mechanism jammed or rocking motor faulty.	*CHECK FOR JAMMED MECHANISM*	Verify performance of the indexing mechanism. See Table 5.10 and Table 5.11.
CANNOT STORE RET RESULTS IN 5C FILE	5C cell control label detected while current sample mode set to RETIC.	*REANALYZE IN CORRECT CYCLE TYPE*	To run 5C cell control sample, change cycle type to CBC+Diff.
CANNOT TRANSMIT CAL FACTORS	Attempt made to transmit calibration factors from Primary or Secondary CBC Calibration screen while the system was running sample.	*MUST STOP INSTRUMENT*	1. From the Sample Analysis Run screen, press F9 **Stop.** 2. Attempt to transmit calibration factors.

Table 5.18 System Error Messages - C *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
CARRYOVER IS ACTIVE	Attempt made to change carryover mode of operation without data in carryover file and carryover sample mode was active.	*TO CHANGE MODE, PRESS F9-STOP*	From the Sample Analysis Run screen, press F9 **Stop** to change mode of operation.
CASSETTE LABEL NO READ	Single *NO READ* of Cass/pos number occurred, or cassette not advanced.	*RESTART, POSITION WILL BE SKIPPED*	1. Check the cassette label for proper positioning. 2. Access the appropriate screen and reselect the mode of operation.
CASSETTE LOAD FAILURE	Cassette does not load; cassette jammed in loading bay.	*CHECK FOR JAMMED CASSETTE*	Remove the jammed cassette. See Heading 4.3, JAMMED CASSETTE REMOVAL.
CASSETTE NOT ADVANCED	Cassette not advanced; cassette jammed in loading bay.	*CHECK FOR JAMMED CASSETTE*	Remove the jammed cassette. See Heading 4.3, JAMMED CASSETTE REMOVAL.
CASSETTE UNLOAD FAILURE	Cassette does not unload; cassette jammed in unloading bay.	*CHECK FOR JAMMED CASSETTE*	Remove the jammed cassette. See Heading 4.3, JAMMED CASSETTE REMOVAL.
CBC CALIBRATION TABLE FULL	CBC calibration completed 60 samples; attempt made to run another sample.	*CLEAR TABLE* *CLEAR TABLE/RERUN TEST*	Clear the table (delete 60 samples table) and reselect the appropriate mode of operation to rerun desired test.
CBC DATA ACQUISITION FAILURE	CBC acquisition could not be completed because of pending error.	*RE-ENTER FUNCTION/ RECYCLE SPECIMEN*	1. Attempt to perform the requested function again, and rerun the specimen. 2. If error recurs, reset the system.
CLEANER OUT	Out-of-cleaner signal detected from reagent sensor; insufficient cleaner to perform another cycle.	*REPLACE CLEANER, UPDATE FILE, PRIME*	1. Replace the cleaning agent. 2. Update the reagent file. 3. Prime the cleaner.
COMMAND COMPLETION NOT SUCCESSFUL	The system could not complete request from DMS.	*CHECK SYSTEM CABLES*	Verify the cables are plugged firmly into the correct jacks. See the Installation Chapter of the Reference manual.
COMMAND TO DIGIBOARD NOT ACCEPTED	Digiboard software detected error and rejected command from DMS.	*CHECK SYSTEM CABLES*	Verify the cables are plugged firmly into the correct jacks. See Installation Chapter of the Reference manual.
COMPRESSOR DID NOT BLEED [XX.XX] **Note**: XX.XX = actual reading.	Compressor bleed sequence activated, but pressure did not drop in specified time.	*CONTACT SERVICE*	Call your Beckman Coulter Representative.

Table 5.18 System Error Messages - C *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
COMPRESSOR PRESSURE ERROR [XX.XX] **Note**: XX.XX = actual reading.	Compressor pressure did not rise to normal operating range.	*PERFORM SYSTEM TEST*	1. Perform System Test to confirm the pressure reading. See Heading 4.2, SYSTEM TEST. 2. If the compressor pressure is still out of range, call your Beckman Coulter Representative.
CONTROL SAMPLE IDENTIFIED	Carryover sample mode active, and 5C control run. Carryover test invalidated.	*BEGIN CARRYOVER TEST AGAIN/QUIT*	If sample identified as control by ID, press F9 **Stop**, reselect the sample mode, and restart the test.
CONTROL SAMPLE IDENTIFIED	Diff mode off when 5C control run; results cannot be reported.	*DIFF OFF, DIFF RESULTS UNAVAILABLE*	Set Diff mode to ON and rerun the 5C control.
COULD NOT ACCESS AUTOPRINT QUEUE	Autoprint queue does not exist or is in use.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT ACCESS BATCH QUEUE	Batch print queue does not exist or is in use.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT ACCESS MANUAL QUEUE	Queue for manual print requests does not exist or is in use.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT CLOSE AUTOPRINT QUEUE	Autoprint queue exists but cannot be closed.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT CLOSE BATCH QUEUE	Batch print queue exists but cannot be closed.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT CLOSE MANUAL QUEUE	Queue for manual print requests exists but cannot be closed.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT DELETE AUTOPRINT DATA	Autoprint file exists that is already spooled; therefore, file cannot be deleted.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.

Table 5.18 System Error Messages - C *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
COULD NOT DELETE AUTOPRINT QUEUE	Autoprint queue does not exist or is in use; therefore, queue cannot be deleted at this time.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT DELETE BATCH DATA	Batch print file exists that is already spooled; therefore, file cannot be deleted.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT DELETE BATCH QUEUE	Batch print queue does not exist or is in use; therefore, queue cannot be deleted at this time.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT DELETE MANUAL DATA	File for manual print queue exists that is already spooled; therefore, file cannot be deleted.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT DELETE MANUAL QUEUE	Queue for manual print requests does not exist or is in use; therefore, queue cannot be deleted at this time.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT FIND AUTOPRINT DATA	Autoprint queue exists; however, there is no data in the queue.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT FIND BATCH DATA	Batch print queue exists; however, there is no data in the queue.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT FIND MANUAL DATA	Queue for manual print requests exists; however, there is no data in the queue.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT OPEN AUTOPRINT QUEUE	Autoprint queue exists; however, it cannot be opened to be read from or written to.	No action message associated with this error.	1. Reset the system. 2. Reselect function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT OPEN BATCH QUEUE	Batch print queue exists; however, it cannot be opened to be read from or written to.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.

Table 5.18 System Error Messages - C *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
COULD NOT OPEN MANUAL QUEUE	Queue for manual print requests exists; however, it cannot be opened to be read from or written to.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT READ FROM AUTOPRINT QUEUE	Autoprint queue exists and is open; however, it cannot be read.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT READ FROM BATCH QUEUE	Batch print queue exists and is open; however, it cannot be read.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT READ FROM MANUAL QUEUE	Queue for manual print requests exists and is open; however, it cannot be read.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT WRITE TO AUTOPRINT QUEUE	Autoprint queue exists and is open; however it cannot be written to.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT WRITE TO BATCH QUEUE	Batch print queue exists and is open; however, it cannot be written to.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
COULD NOT WRITE TO MANUAL QUEUE	Queue for manual print requests exists and is open; however, it cannot be written to.	No action message associated with this error.	1. Reset the system. 2. Reselect the function. 3. If error recurs, call your Beckman Coulter Representative.
CRC ERROR ON READ SYSTEM.CFG FILE	Cyclic redundancy check (CRC) error occurred while reading SYSTEM.CFG file. System locked up.	RESET THE SYSTEM	Reset the system.
CTL FILE I/O ERROR	Control file input/output error occurred. System locked up.	RESET THE SYSTEM	Reset the system.
CTL FILE NN, <FILE> IS FULL	Control file number NN, filename <FILE> full; no further data can be saved to file.	CLEAR THE CONTROL FILE	1. Delete data in control file NN. 2. Reselect the mode of operation. 3. Restart the test.

Table 5.19 System Error Messages - D through H

Error Message	Probable Cause	Action Message	Corrective Action
DIFF DATA ACQUISITION FAILURE	Differential data acquisition could not be completed because of pending error.	*RE-ENTER FUNCTION/ RECYCLE SPECIMEN*	Reselect the function, and recycle the specimen.
DIFF PRESSURE OUT OF RANGE	Differential pressure not within established operating range.	*CHECK/ADJUST DIFF PRESSURE*	1. Perform System Test to confirm the problem. See Heading 4.2, SYSTEM TEST. 2. If the diff pressure is still out, call your Beckman Coulter Representative.
DILUENT COMPARISON OUT OF LIMITS	Diluent comparison out of limits and could not detect presence of diluent.	*PRIME DILUENT AND REPEAT THE SAMPLE*	1. Prime the diluent, and repeat the sample. 2. If problem recurs, check that the BSV is rotating completely. If it is not, clean and cycle the BSV. See Heading 3.3, CLEAN OUTSIDE OF BLOOD SAMPLING VALVE (BSV) and Heading 3.4, CYCLE BSV.
DILUENT OUT	Out-of-diluent signal detected from reagent sensor; insufficient diluent to perform another cycle.	*REPLACE DILUENT, UPDATE FILE, PRIME*	1. Replace the diluent. 2. Update the reagent file. 3. Prime the diluent.
DILUTER NOT DOWNLOADED	Instrument could not find usable diluter table.	*RESET THE SYSTEM*	Ensure that the lower front door is closed. Reset the system.
DILUTER TABLE ERROR	During download, instrument could not find usable diluter table.	*RESET THE SYSTEM*	Reset the system.
DISK DRIVE C: COULD NOT BE ACCESSED	Drive C has less than one megabyte of space left; therefore, new file for queue cannot be created in drive C.	No action message associated with this error.	Call your Beckman Coulter Representative.
DISK DRIVE C: IS FULL	Space on drive C hard disk insufficient for execution of requested option.	*CHECK DATABASE/ REMOVE DATA*	Call your Beckman Coulter Representative.
DISK DRIVE D: IS FULL	Space on drive D hard disk insufficient for execution of requested option.	*CHECK/CLEAR CONTROL FILES*	Call your Beckman Coulter Representative.
DMS TIMEOUT	DMS did not respond to instrument request in allotted time. The system locked up.	*RESET THE SYSTEM*	Reset the system.

Table 5.19 System Error Messages - D through H *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
DOWNLOAD NOT SUCCESSFUL	Errors occurred during download of software to instrument from DMS.	*CHECK ERROR LOG*	1. Check the Error Log to determine why the download was unsuccessful. 2. Reset the system. 3. If problem recurs, call your Beckman Coulter Representative.
ERROR FILE I/O ERROR	Error file input/output error occurred on ERROR file. The system locked up.	*RESET THE SYSTEM*	Reset the system.
ERROR READING SYSTEM.CFG FILE	SYSTEM.CFG file could not be read. The system locked up.	*RESET THE SYSTEM*	Reset the system.
ERROR UPDATING SYSTEM.CFG FILE	SYSTEM.CFG file could not be updated. The system locked up.	*RESET THE SYSTEM*	Reset the system.
EXTENSIVE FLAGS GENERATED	Cell classification flags too extensive to display on screen.	*PRINT FOR A COMPLETE LISTING*	Print the sample results to get a complete list of generated flags.
FILE I/O ERROR	File input/output error occurred. The system locked up.	*RESET THE SYSTEM*	Reset the system.
HGB OUT OF RANGE	Hemoglobin lamp voltage not within established operating range. Range is 6.65 to 7.35 V.	*PERFORM SYSTEM TEST*	1. Perform System Test to confirm the problem. See Heading 4.2, SYSTEM TEST. 2. If the Hgb is still out of range: a. Check the Hgb lamp and replace it if it is out. See Heading 4.9, REPLACE HEMOGLOBIN LAMP ASSEMBLY. b. Adjust the Hgb lamp. See the adjust portion of Heading 4.9, REPLACE HEMOGLOBIN LAMP ASSEMBLY.
HIGH VACUUM OUT OF RANGE	High vacuum not within established operating range. Range is 17.00 to 28.00 in. of Hg (at sea level).	*CHECK/ADJUST HIGH VACUUM*	1. Check that the vacuum trap is not full of liquid. 2. Check for any obviously split or disconnected tubing. 3. Perform System Test to confirm the high vacuum reading. See Heading 4.2, SYSTEM TEST. 4. If the high vacuum is still out of range, call your Beckman Coulter Representative.
HmX TX BUFF REQUEST NOT SUCCESSFUL	DMS attempted to start new operation before previous operation completed.	*CHECK HmX CABLES*	Verify the cables are plugged firmly into the correct jacks. See Installation Chapter of the Reference manual.

Table 5.19 System Error Messages - D through H *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
HOST COMM. PARAMETERS UNDEFINED	Host communication parameters not defined.	*DEFINE AND SAVE PARAMETERS*	Define the host parameters on the Communication Definition screen, and save.
HOST TX BUFF REQUEST NOT SUCCESSFUL	DMS attempted to start new operation before previous operation completed.	*CHECK HOST CABLES*	Verify the host computer cables are plugged firmly into the correct jacks. See Installation Chapter of the Reference manual.

Table 5.20 System Error Messages - I

Error Message	Probable Cause	Action Message	Corrective Action
ID CANCELED-TIME EXPIRED	Sample ID number entered was canceled because time to respond to Cancel prompt expired.	*REENTER PATIENT ID*	Re-enter the sample ID number, and process sample.
IDENTIFICATION REQUIRED	Sample ID number must be entered to process sample.	*RETURN TO SAMPLE ANALYSIS, ENTER ID*	1. Return to the Sample Analysis screen, and enter sample ID number. 2. Process the sample.
ILLEGAL INSTRUMENT REPLY	Illegal reply received from instrument. The system locked up.	*RESET THE SYSTEM*	Reset the system.
INCOMPATIBLE SAMPLE HANDLER SOFTWARE	Instrument detected that downloaded software incompatible with sample handler hardware. The system locked up.	No action message associated with this error.	1. Reset the system. 2. If problem recurs, call your Beckman Coulter Representative.
INCOMPLETE NEEDLE EXTRACT	Needle did not fully retract from tube; needle jammed or sensor failed.	*REFER TO MANUAL FOR HELP*	See the Troubleshooting section in Table 5.13 for corrective actions.
INCOMPLETE NEEDLE PIERCE	Needle did not completely pierce tube.	*REFER TO MANUAL FOR HELP*	See the Troubleshooting section in Table 5.13 for corrective actions.
INCOMPLETE NEEDLE RETRACT	Needle did not fully retract after piercing tube; needle jammed or sensor failed.	*REFER TO MANUAL FOR HELP*	See the Troubleshooting section in Table 5.13 for corrective actions.
INCOMPLETE RAW DATA TRANSMISSION	Raw data could not be completely transmitted because size of RAW.DAT file inadequate. The system locked up.	*RESET THE SYSTEM*	Reset the system.
INCOMPLETE TUBE FORWARD	Tube did not move completely forward; tube jammed.	*CHECK FOR A JAMMED TUBE*	Remove the jammed tube. See the checks listed in Table 5.14.
INCOMPLETE TUBE RETRACT	Tube did not return to cassette from piercing position; tube jammed.	*CHECK FOR A JAMMED TUBE*	Remove the jammed tube. See Table 5.14.
INCONSISTENT SAMPLE HANDLER HARDWARE	Instrument detected that downloaded software incompatible with sample handler hardware. The system locked up.	*CHECK HARDWARE-REIN STALL SOFTWARE*	1. Reset the system. 2. If error recurs, call your Beckman Coulter Representative.
INSTRUMENT CONFIGURATION ERROR	Error detected in random access memory (RAM). The system locked up.	*RESET THE SYSTEM*	Reset the system.

Table 5.20 System Error Messages - I *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
INSTRUMENT INTERNAL ERROR XXX **Note**: XXX = actual internal code number.	Internal instrument error detected by CPU. The system locked up.	*RESET THE SYSTEM*	Reset the system.
INSTRUMENT REPLY TIMEOUT	Time expired while waiting for reply from instrument. The system locked up.	*RESET THE SYSTEM*	Ensure that the lower front door is closed. Reset the system.
INSTRUMENT TO 196 CODE DWNLD FAILED	196 code download failed from instrument to sample handler. The system locked up.	*RESET THE SYSTEM*	Ensure that the lower front door is closed. Reset the system.
INV LABEL - STORED IN CURRENT MODE	Beckman Coulter label other than 5C control bar-code ID label (that is, 4C Plus cell control or S-CAL calibrator) detected.	*USE VALID LABELS ONLY*	Acknowledge error by pressing Alt+End to stop beeping. Rerun sample with the 5C cell control bar-code ID label.
INVALID 376 MOD/CMD RCVD 196 DWNLD	During 196 download, DMS received response from instrument with incorrect destination.	*RESET THE SYSTEM*	Reset the system.
INVALID 376 MOD/CMD RCVD 196CFG DLD	During 196 configuration download, DMS received response from instrument with incorrect destination.	*RESET THE SYSTEM*	Reset the system.
INVALID MOD/CMD IN DLTR DWNLD	During diluter download, DMS received response from instrument with incorrect destination.	*RESET THE SYSTEM*	Reset the system.
INVALID MOD/CMD RCVD 376CFG DWNLD	During 376 configuration download, DMS received response from instrument with incorrect destination.	*RESET THE SYSTEM*	Reset the system.
INVALID MOD/CMD RCVD IN DLTR DWNLD	During diluter download, DMS received response from instrument with incorrect destination.	*RESET THE SYSTEM*	Reset the system.
INVALID SYSTEM COMMAND	Sample handler detected invalid command from instrument. The system locked up.	*RESET THE SYSTEM*	Reset the system.

Table 5.21 System Error Messages - J through P

Error Message	Probable Cause	Action Message	Corrective Action
LESS THAN 1 MEGABYTE LEFT ON DRIVE C	Drive C has less than one megabyte of space.	No action message associated with this error.	Call your Beckman Coulter Representative.
LOAD ELEVATOR FAILURE	Load (right) elevator not functioning. Load elevator's motor may have failed.	*CHECK ELEVATOR MECHANISM*	Verify performance of the elevator mechanism. See Table 5.9.
LOAD STACK NOT EMPTY	Loading bay not empty. This prevents load (right) elevator from functioning properly.	*EMPTY THE LOAD STACK*	1. Empty the loading bay. 2. To test performance of loading elevator, reselect desired function.
LOW VACUUM OUT OF RANGE	Low vacuum out of established operating range. Range is 5.940 to 6.060 in. of Hg (at sea level).	*CHECK/ADJUST LOW VACUUM*	1. Check that the vacuum trap is not full of liquid. 2. Check for any obviously split or disconnected tubing. 3. Perform System Test to check the vacuum. See Heading 4.2, SYSTEM TEST. 4. Adjust the vacuum. See Heading 4.4, ADJUST PRESSURE AND LOW VACUUM.
LOWER DOOR OPEN	Door opened when not in Stop mode.	*CLOSE DOOR/RESELECT FUNCTION*	Close door and reselect the desired function.
LYSE OUT	Out-of-lyse signal detected from reagent sensor; insufficient lytic reagent to perform another cycle.	*REPLACE LYSE, UPDATE FILE, PRIME*	1. Replace the lytic reagent. 2. Update the reagent file. 3. Prime the lyse.
MEMORY ERROR	DMS memory error detected. The system locked up.	*RESET THE SYSTEM*	Reset the system.
MULT. INTER. WHILE RECEIVING DATA	DMS detected communication errors while receiving data. The system locked up.	*RESET THE SYSTEM*	Reset the system.
MULTIPLE ERRORS	More than one error detected by instrument.	*CHECK ERROR LOG*	Check Error Log (Ctrl+F2) to see which errors occurred and the appropriate corrective actions.
NEEDLE FORWARD SENSOR ERROR	Needle forward sensor may be faulty.	*REFER TO MANUAL FOR HELP*	1. Clean the needle forward sensor. See Heading 3.7, CLEAN NEEDLE FORWARD SENSOR. 2. If error recurs, call your Beckman Coulter Representative.
NEEDLE HOME SENSOR ERROR	Needle home sensor may be faulty.	*REFER TO MANUAL FOR HELP*	Call your Beckman Coulter Representative.

Table 5.21 System Error Messages - J through P *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
NO PARAMETER SELECTED	Enter Calibration Factors or Enter Secondary Cal Factors requested before parameters for calibration were selected.	*CANNOT ENTER CAL FACTORS*	From the F5-Optns/Select Parameters screen, select the parameters to be calibrated.
NO PARAMETER SELECTED	Transmission of calibration factors requested, but parameters for calibration were not selected.	*CANNOT TRANSMIT*	From the F5-Optns/Select Parameters screen, select the parameters to be calibrated and transmitted.
PAK OUT	Out-of-PAK signal detected from reagent sensor; insufficient PAK reagent to perform another cycle.	*REPLACE PAK, UPDATE FILE, PRIME*	1. Replace the PAK. 2. Update the reagent file. 3. Prime the PAK.
PARTIAL ASPIRATION	Two attempts to aspirate from single tube unsuccessful.	*CHECK THE SPECIMEN AND SYSTEM*	1. Ensure the specimen tube has sufficient whole blood. 2. Delete one or more samples associated with error from worklist. 3. Rerun the specimen in the Primary mode. 4. If error recurs, rerun that specimen in the Secondary mode.
PATIENT ID REQUIRED FOR PROCESSING	Attempt made to aspirate sample without entering patient ID.	*ENTER ID? YES, CANCEL*	Enter patient ID and resume processing.
PREVIOUS SAMPLE NOT XMITTED TO HOST	Previous sample's result not transmitted to host computer.	*CHECK HOST CABLES/SETTING*	1. If this error occurred and you do not have a host computer connection, reset the system. 2. Verify the host computer cables are plugged firmly into the correct jacks. See Installation Chapter of the Reference manual. 3. If error recurs, verify host computer setting on Host Computer Definition window.
PRN TX BUFF REQUEST NOT SUCCESSFUL	Memory buffer to send data to Ticket Printer requested but not obtained.	*CHECK PRINTER CABLES*	Verify the printer cables are plugged firmly into the correct jacks. See Installation Chapter of the Reference manual.

Table 5.22 System Error Messages - R

Error Message	Probable Cause	Action Message	Corrective Action
RAW DATA SPACE FULL-CAPTURE OFF	Space where raw data stored is full; raw data capture canceled.	*BACKUP AND DELETE RAW DATA*	Call your Beckman Coulter Representative.
RAW DATA SWITCH OFF	Raw data sent; however, raw data switch option turned OFF at DMS.	*TURN RAW SWITCH ON*	Call your Beckman Coulter Representative.
RAW DATA TRANSMISSION ERROR	The system error detected during raw data transmission. The system locked up.	*RESET THE SYSTEM*	Reset the system.
RAW FILE TOO LARGE	RAW.DAT file too large. The system locked up.	*RESET THE SYSTEM*	Reset the system.
RBC AND WBC BATH OVERFLOW	RBC and WBC baths overflowed.	*CHECK ERROR LOG AND FLUIDICS*	See Table 5.8.
RBC BATH OVERFLOW	RBC bath overflowed.	*CHECK ERROR LOG AND FLUIDICS*	See Table 5.8.
RBC VALUE MUST BE > 0 AND < OR EQUAL TO 9.99	Out-of-range RBC value entered.	*PLEASE REENTER RBC VALUE*	Enter valid RBC value.
RBC VALUE MUST BE > 0 AND < OR EQUAL TO 999	Out-of-range RBC value entered.	*PLEASE REENTER RBC VALUE*	Enter valid RBC value.
RED A/I/V OUT OF RANGE	Red aperture current voltage (A/I/V) out of established operating range. Range is 141.5 to 169.1 V.	*PERFORM SYSTEM TEST*	Perform System Test. See Heading 4.2, SYSTEM TEST. If the problem recurs, call your Beckman Coulter Representative.
REPRODUCIBILITY IS ACTIVE	Attempt made to change Reproducibility mode of operation without data in reproducibility file and another Reproducibility mode active.	*TO CHANGE MODE, PRESS F9-STOP*	Change mode of operation by pressing F9 **Stop**.
REPRODUCIBILITY TABLE FULL	Reproducibility cycle completed 60 samples; attempt made to run another sample.	*CLEAR TABLE* *CLEAR TABLE/RERUN TEST*	1. Clear the table (delete 60 sample table). 2. Reselect the appropriate mode of operation to rerun the desired test.
RETIC VOLTAGE ERROR [XX.XX] **Note:** XX.XX = actual reading.	Retic voltage out of established operating range. Range is 0.20 to 1.20 Vdc.	*PERFORM SYSTEM TEST*	Perform System Test. See Heading 4.2, SYSTEM TEST.

Table 5.22 System Error Messages - R *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
RETRIES EXCEEDED IN DILUTER DWNLD	Three attempts to download diluter table from DMS to instrument failed. The system locked up.	*RESET THE SYSTEM*	Reset the system.
RETRIES FAILED 196CODE DWNLD TO 376	Three attempts to download 196 code from DMS to instrument failed. The system locked up.	*RESET THE SYSTEM*	Ensure the lower front door is closed. Reset the system.
RF VOLTAGE LOW	RF voltage dropped below lower limit due to weak RF oscillator circuit.	*PERFORM SYSTEM TEST*	1. Check that correct diluent is in use. Blood bank saline can cause this error. 2. Check that the diluent is primed. 3. Perform System Test to confirm the problem. See Heading 4.2, SYSTEM TEST. 4. A clogged flow cell can cause this error. Clear the flow-cell clog. See Heading 3.6, CLEAR FLOW CELL CLOG. 5. If the RF voltage is still low, call your Beckman Coulter Representative.
RINSE BLOCK ERROR	Rinse block did not return to home position.	*CONTACT SERVICE*	Check if the manual aspirate probe is fully extended. Check if the aspirate probe is bent. Call your Beckman Coulter Representative.
ROCKER BED NOT EMPTY	Cassette placed directly onto rocker bed after a “Clear the Bed/Autoloader Home” function initiated.	*RESTART THE FUNCTION*	Reinitiate the "Clear the Bed/Autoloader Home" function to automatically clear the bed.

Table 5.23 System Error Messages - S

Error Message	Probable Cause	Action Message	Corrective Action
SAMPLE HANDLER COMM. FAILURE	Instrument received illegal message or has not received any message from sample handler.	*RESET THE SYSTEM.*	Reset the system.
SAMPLE HANDLER COMMUNICATION ERROR	Analyzer lost communication with sample handler. The system locked up.	*RESET THE SYSTEM.*	Reset the system.
SAMPLE HANDLER NOT DOWNLOADED	Instrument failed to download 196 code to sample handler. The system locked up.	*RESET THE SYSTEM.*	Ensure the lower front door is closed. Reset the system.
SAMPLE HANDLER NOT OPERATIONAL	Instrument detected severe sample-handler error.	*RESET THE SYSTEM.*	Reset the system.
SAMPLE HANDLER SENSOR 16 ERROR	Error detected by sample-handler sensor 16. Needle not aligned.	*CHECK NEEDLE ALIGNMENT*	Call your Beckman Coulter Representative.
SAMPLE HANDLER SENSOR 17 ERROR	Error detected by sample-handler sensor 17. Bed position sensor should be cleaned or is faulty.	*CLEAN BED POSITION SENSOR*	1. Clean the Autoloader module bed-position sensors. See Heading 5.4, AUTOLOADER CHECK PROCEDURES. 2. To resume operation, access the appropriate screen, reselect mode of operation, and rerun the sample.
SAMPLE HANDLER TIMEOUT ERROR	Instrument did not respond to sample handler within specified time.	*RESET THE SYSTEM.*	Ensure the lower front door is closed. Reset the system.
SAMPLE NOT TRANSMITTED TO HOST	Sample's result not transmitted to host computer.	*CHECK HOST CABLES*	Verify the host computer cables are plugged firmly into the correct jacks. See Installation Chapter of the Reference manual.
SEC CBC CALIBRATION TABLE FULL	Secondary CBC calibration completed 60 samples; attempt made to run another sample.	*CLEAR TABLE* *CLEAR TABLE/RERUN TEST*	1. Clear the table (delete 60 sample table). 2. Reselect the appropriate mode of operation to rerun the desired test.
SEND TO INSTRUMENT FAILED - 196CODE	Transmission of 196 code from DMS to instrument failed. The system locked up.	*RESET THE SYSTEM.*	Reset the system.
SHEATH PRESSURE OUT OF RANGE	Sheath pressure out of established operating range. Range is 5.80 to 6.20 psi.	*CHECK/ADJUST SHEATH PRESSURE*	1. Perform System Test to check the sheath pressure. See Heading 4.2, SYSTEM TEST. 2. Adjust the sheath pressure. See Heading 4.4, ADJUST PRESSURE AND LOW VACUUM.

Table 5.23 System Error Messages - S *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
SHEATH TANK EMPTY	Sheath tank is empty.	*CHECK/PRIME DILUENT*	1. Check the sheath tank and tubing for any obvious problems. 2. Prime the diluent. See Heading 4.12, REPLACE REAGENT CONTAINERS.
SHUTDOWN PERFORMED PREVIOUSLY	Attempt made to select sample mode through F3-Run window before Startup cycle performed. (Shutdown cycle performed previously and DMS software disabled sample cycles. Startup cycle must be performed.)	*MUST PERFORM STARTUP*	1. Run Startup. See Operator's Guide. 2. Select the desired mode to run tests.
SOFTWARE AUTOLOADER CHECK FAILED	When Startup initiated, Autoloader module failed at least one of checks performed.	*PERFORM AUTOLOADER TEST ROUTINE*	Run the Autoloader Test function. See Heading 5.4, AUTOLOADER CHECK PROCEDURES.
STOP SWITCH ACTIVATED	Stop switch activated when Autoloader module not in Stop mode.	*RESELECT FUNCTION*	Access the appropriate screen and reselect desired function. Ensure the switch cable is not disconnected.
SYSTEM BACKGROUND TIME OUT	Instrument did not respond to background request in specified time.	*CHECK DIGIBOARD*	Call your Beckman Coulter Representative.

Table 5.24 System Error Messages - T

Error Message	Probable Cause	Action Message	Corrective Action
TEMP: AMBIENT=XX.XX LYSE=XX.XX **Note:** XX.XX = actual reading.	The system temperature error occurred.	*CYCLE NEXT SPECIMEN*	Run next sample cycle.
TEMP: AMBIENT=XX.XX LYSE=XX.XX **Note:** XX.XX = actual reading.	Peltier module error occurred. XX.XX = actual ambient and lyse readings.	*PERFORM CBC ONLY*	Run CBC sample with DIFF OFF.
TEST MODE INTERRUPTED	The system put into Stop mode before requested number of aspirations per tube completed.	*RESTARTING TEST WILL ASP # SELECTED*	Restart the test. Aspiration count begins at selected number.
TICKET PRINTER NOT READY	Ticket Printer did not accept print request.	*CHECK TICKET PRINTER*	Verify the Ticket Printer is plugged in, properly connected, and has a ticket in the slot.
TKT.CFG FILE I/O ERROR	An input/output error occurred on TKT.CFG file. The system locked up.	*RESET THE SYSTEM*	Reset the system.
TRANSMIT FAILED - 196 CODE	Transmission of 196 code from DMS to instrument failed. The system locked up.	*RESET THE SYSTEM*	Reset the system.
TRANSMIT FAILED - 376 CODE	Transmission of 376 code from DMS to instrument failed. The system locked up.	*RESET THE SYSTEM*	Reset the system.
TRANSMIT FAILED - DILUTER TABLE	Transmission of diluter table from DMS to instrument failed. The system locked up.	*RESET THE SYSTEM*	Reset the system.
TRANSMIT PORT NOT AVAILABLE	Transmit port not available for transmission between DMS and instrument.	*CHECK SYSTEM CABLES*	Verify the cables are plugged firmly into the correct jacks. See Installation Chapter of the Reference manual.
TRANSMIT TO 376 FAILED - 196 CODE	Transmission of 196 code from DMS to instrument failed. The system locked up.	*RESET THE SYSTEM*	Reset the system.

Table 5.25 System Error Messages - U

Error Message	Probable Cause	Action Message	Corrective Action
UNABLE TO OPEN/READ 196CODE.HEX	DMS download code not able to open/read 196CODE.HEX file and retrieve 196 code revision number. The system locked up.	*RESET THE SYSTEM*	Reset the system.
UNABLE TO OPEN/READ 376CODE.HEX	DMS download code not able to open/read 376CODE.HEX file and retrieve 376 code revision number. The system locked up.	*RESET THE SYSTEM*	Reset the system.
UNABLE TO OPEN/READ DILUTER TBL	DMS download code not able to open/read DILUTE.TBL file and retrieve diluter table revision number. The system locked up.	*RESET THE SYSTEM*	Reset the system.
UNABLE TO PROCESS REQUEST	DMS could not process requested function because a MODE-NOT-ACCEPTED or START-NOT-ACCEPTED signal received from instrument.	*RETRY THE FUNCTION*	1. Press F9 **Stop** to verify the mode was not previously selected. 2. Reselect the desired function.
UNIDENTIFIED ERROR [XXXX] **Note**: IXXX = instrument internal code; SXXX = sample handler internal code.	Internal and unidentifiable instrument error with no message detected by CPU. The system locked up.	*RESET THE SYSTEM*	Reset the system.
UNIDENTIFIED S44 ERROR	Failure in tube-available switch. Probably due to: • Poor contacts. • A very narrow tolerance of switch contact within "walks" along rocker bed. • Slippage of cassette during indexing. Possibly due to switch failure.	Internal code only.	Call your Beckman Coulter representative.
UNIDENTIFIED S45 ERROR	Failure in tube-available switch after indexing and detection of last tube in cassette. Probably due to: • Poor contacts. • A very narrow tolerance of switch contact within "walks" along rocker bed. • Slippage of cassette during indexing.	Internal code only.	Call your Beckman Coulter representative.

Table 5.25 System Error Messages - U *(Continued)*

Error Message	Probable Cause	Action Message	Corrective Action
UNIDENTIFIED S55 ERROR	Over-allocation of all available software timers.	Internal code only.	If error occurs frequently, determine frequency of error and call your Beckman Coulter Representative.
UNIDENTIFIED S57 ERROR	False interrupt associated with either door or stop switches on Sample Handler. • Could be due to noise associated with twisted pair wires or connector on cable attached to stop switch. • Less likely due to any electrical noise induced into C196 microprocessor's external interrupt pin.	Internal code only.	Call your Beckman Coulter Representative.
UNLOAD ELEVATOR FAILURE	Unload (left) elevator not functioning. Unload elevator's motor may have failed.	*CHECK ELEVATOR MECHANISM*	Verify performance of the elevator mechanism. See Table 5.9.
UNLOAD STACK FULL	Unloading bay reached maximum capacity.	*EMPTY THE UNLOAD STACK*	Remove the cassettes from the unloading bay so additional cassettes can be dispensed from the rocker bed.

Table 5.26 System Error Messages - V through Z

Error Message	Probable Cause	Action Message	Corrective Action
WASTE CONTAINER FULL	Waste container is full.	*EMPTY WASTE CONTAINER*	Empty the waste container, then resume operation. Check that the harness is connected to the waste pickup tube. See Heading 4.16, REPLACE WASTE CONTAINER.
WATER TRAP DID NOT BLEED [XX.XX] **Note:** XX.XX = actual reading.	Water trap bleed solenoid activated, but pressure did not drop in specified time.	*CONTACT SERVICE*	Call your Beckman Coulter Representative.
WBC BATH OVERFLOW	WBC bath overflowed.	*CHECK ERROR LOG AND FLUIDICS*	See Table 5.8.
WHITE A/I/V OUT OF RANGE	White aperture current voltage (A/I/V) not within established operating range. Range is 100.6 to 129.6 V.	*PERFORM SYSTEM TEST*	1. Perform System Test to confirm the problem. See Heading 4.2, SYSTEM TEST. 2. If the white A/I/V is still out of range, call your Beckman Coulter Representative.
WORKLIST ERRORS NOT CLEARED	Three consecutive *NO READ* or *NO MATCH* errors, or 10 total *NO READ*, *NO MATCH* or *PART ASP* errors occurred and are stored in Worklist file.	*CLEAR ERRORS/CHECK LABELS/RESTART* *CLEAR ERRORS/CHECK WLIST/RESTART*	1. Check the labels for proper positioning, and check the worklist for *NO MATCH* errors. 2. Delete one or more samples associated with the errors from the worklist. 3. Restart the system.
WORKLIST FULL	Maximum number of preassigned samples (300) and worklist errors (10) exceeded.	*RUN SAMPLES*	Remove some samples with errors, or clear the worklist by running samples.
WRONG DIGIBOARD SOFTWARE	Digiboard incorrectly installed or faulty.	*CHECK DIGIBOARD*	Call your Beckman Coulter Representative.
WRPORT UNAVAIL FOR 376 CODE	Analyzer not communicating with Digiboard. The system locked up.	*RESET THE SYSTEM*	Reset the system.

Numerics

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